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NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
NOTCH RESERVOIR DAM (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV JUN 79

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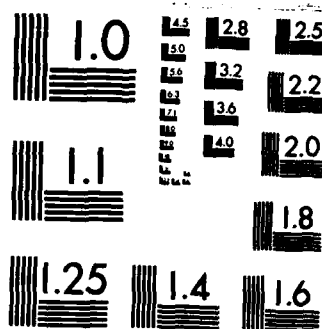
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AD-A154 665

HOOSIC RIVER BASIN
NORTH ADAMS, MASSACHUSETTS

NOTCH RESERVOIR DAM
MA 00283

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JUNE 1979

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is an earthen embankment about 584 ft. long and 60 ft. high. The dam is in fair condition. Evidence of seepage was noticed at the toe of the dam. The dam is intermediate in size and the hazard potential is high. Investigations are recommended to determine the stability of the embankment, the effect of seepage and the need and means of increasing the discharge capabilities at the facility. There are also a few remedial measures for the owner to undertake.		

NOTCH RESERVOIR
MA 00283

HOOSIC RIVER BASIN
NORTH ADAMS, MASSACHUSETTS

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Identification No. : MA 00283
Name of Dam: NOTCH RESERVOIR DAM
Town: CITY OF NORTH ADAMS
County and State: BERKSHIRE COUNTY, MA
Stream: NOTCH BROOK
Date of Inspection: 30 APRIL 1979

BRIEF ASSESSMENT

Notch Reservoir Dam is an earthen embankment approximately 584 feet long and 60 feet high. A 36 foot wide spillway partially formed by natural ledge rock and stone masonry walls is at the right abutment of the dam. A concrete overflow structure to Mount Williams Reservoir is located at the left abutment of the dam. Two 30 inch pipes and one 20 inch pipe serve as the outlet works at the dam and as an intake to a water transmission line to the City of North Adams. The dam was constructed in 1896-1897, the overflow structure was constructed in 1915 and the spillway was rebuilt in 1948.

The dam is in fair condition. Evidence of seepage was noticed at the toe of the dam. There is also an apparent bulge about 50 feet wide at the base of the downstream slope of the dam.

Based on the size classification, intermediate, and the hazard potential classification, high, in accordance with Corps of Engineers Guidelines, the spillway test flood is the Probable Maximum Flood (PMF). Hydraulic analysis indicates that the spillway capacity at top of dam with flashboards removed is approximately 1,200 cfs, which is about 23 percent of the routed test flood outflow of 5,275 cfs. The estimated test flood stage is about 1.5 feet above the top of the dam. If, in addition to the spillway, with reservoir at top of dam, the overflow to Mount Williams had all stoplogs removed and the gates for the two 30 inch and one 20 inch outlet pipes were in the open position, it would add approximately another 760 cfs to the discharge capabilities at the facility which would become 37 percent of the routed test flood outflow.

Investigations are recommended to determine the stability of the embankment, the effect of seepage, and the need and means of increasing the discharge capabilities at the facility. Remedial measures recommended include the cutting of grass and weeds, the restoration of riprap, the removal of overhanging trees at the spillway, the replacing of missing mortar at the spillway, the patching of concrete at the overflow structure and minor items of repair at the outlet gatehouse. It is also recommended that due to the presence of seepage, the dam be kept under observation during periods of high reservoir levels and unusually heavy precipitation. The

Owner should develop a formal maintenance program, operational procedure, and emergency procedures plan and should institute a program of annual technical inspections. The remedial measures and recommendations should be performed within one year of receipt of the report by the Owner.

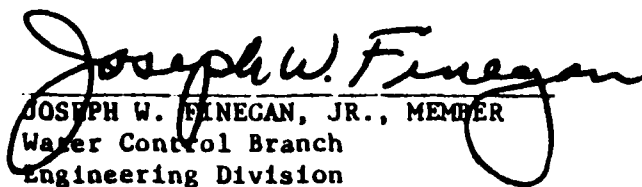
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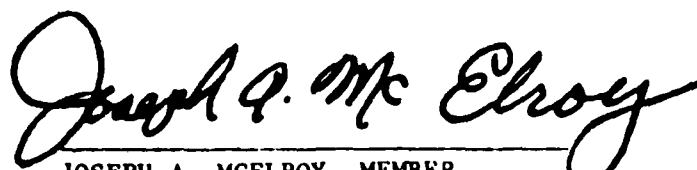
Roger H. Wood

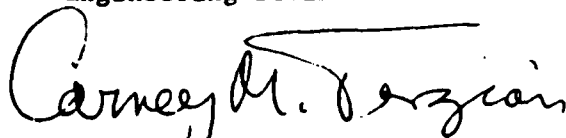
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Vice President



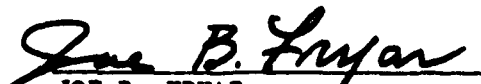
This Phase I Inspection Report on Notch Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.


JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division


JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division


CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:


JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm runoff), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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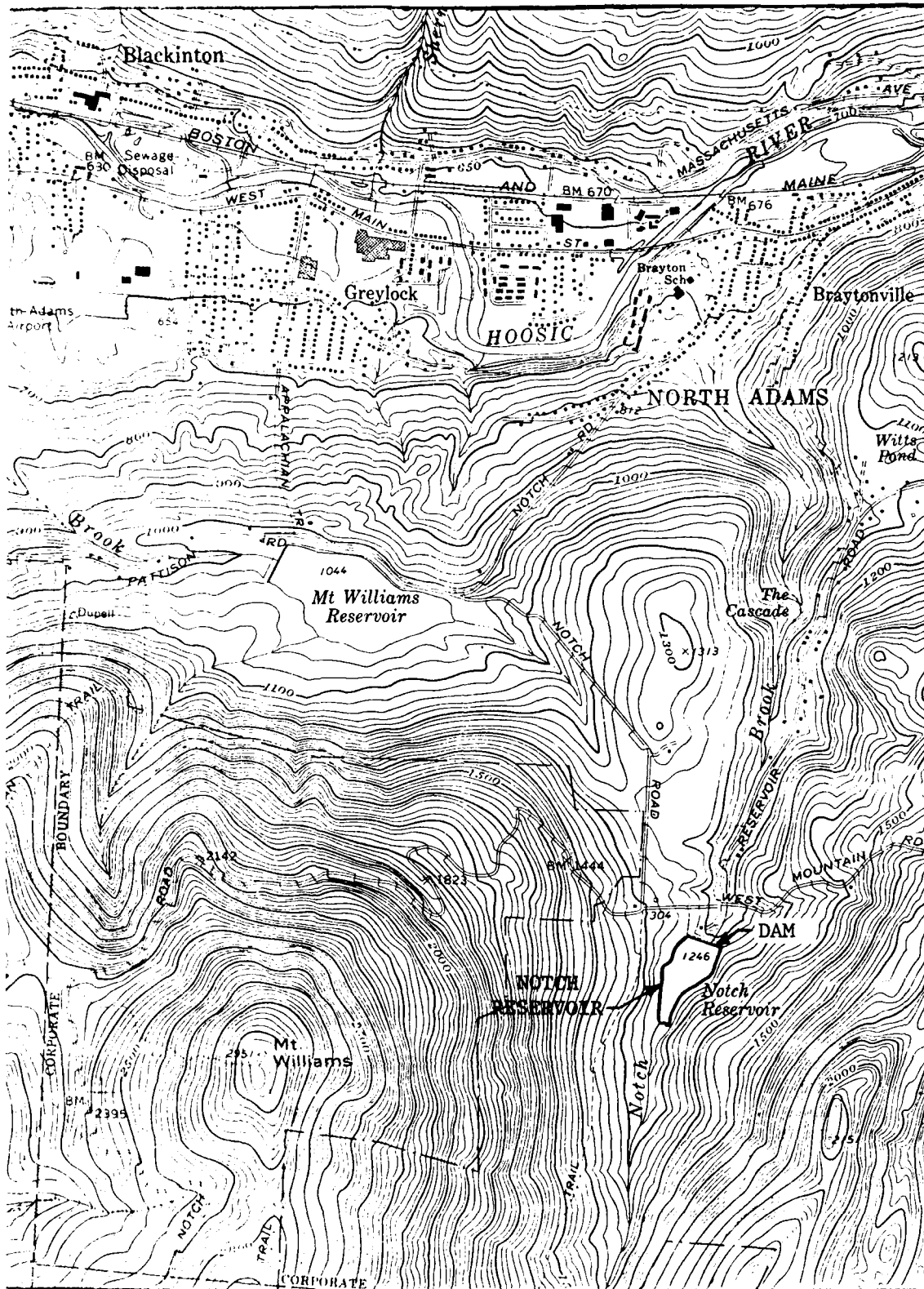
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1. OVERVIEW OF DAM FROM RIGHT ABUTMENT.



<p>NOTCH RESERVOIR DAM</p> <p>NOTIFICATION NO. MA 00283</p>		<p>LOCATION MAP USGS QUADRANGLE WILLIAMSTOWN, MA-VT</p> <p>APPROX. SCALE: 1" = 2000'</p>
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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

NOTCH RESERVOIR DAM
MA 00283

SECTION 1: PROJECT INFORMATION

General

- a. Authority - Public Law 92-367, 8 August, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Camp Dresser & McKee Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Camp Dresser & McKee Inc. under a letter of 27 March 1979, from Colonel John P. Chandler, Corps of Engineers. Contract No. DACW 33-79-C-0053 has been assigned by the Corps of Engineers for this work. Haley and Aldrich, Inc. has been retained by Camp Dresser & McKee Inc. for the soils and geological portions of the work.

- b. Purpose - The primary purpose of the investigation is to:

- (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.
- (2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.
- (3) Update, verify and complete the National Inventory of Dams.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

Dam Assessment

1. Condition - The visual examination of Notch Reservoir Dam and spillway revealed no conditions which would warrant urgent remedial action. However, because the downstream slope is relatively steep compared to similar structures of this size and the engineering properties of the embankment are unknown, plus the existence of seepage, the overall condition of the dam embankment can be considered only fair.
2. Adequacy of Information - The evaluation of the dam embankment and spillway has been based primarily on the visual examination, consideration of available records, and past performance and application of engineering judgment. Generally, the information available or obtained was adequate for the purposes of the Phase I assessment. However, it is recommended that additional information relative to embankment stability be obtained, as outlined in Section 7.2.
3. Urgency - The recommendations for additional investigations and remedial measures, outlined in Sections 7.2 and 7.3, respectively, should be undertaken by the Owner within one year after receipt of this report.
4. Need for Additional Investigations - Additional investigations should be performed by the Owner as outlined in Section 7.2

Recommendations

It is recommended that the Owner arrange for the following investigations to be undertaken by a registered professional engineer:

1. Investigate the long term stability of the embankment including consideration of potential for and effects of surficial raveling and the effects of potential changes in seepage conditions. This would require a program of subsurface exploration. The seepage conditions noted during the visual examination should be regularly monitored to determine if conditions are changing with time.
2. A detailed hydrologic-hydraulic investigation to determine the needs and means of increasing the discharge capabilities at this facility.

SECTION 6: STRUCTURAL STABILITY

Evaluation of Structural Stability

- a. Visual Observations - There was no visible evidence of dam or spillway instability during the site examination on 30 April 1979. The downstream slope is relatively steep, at 1.5H to 1V. Evidence of localized surficial slope movement was noted at the embankment toe. Evidence of seepage was apparent at the toe and on the right abutment. These conditions are not considered to be indicative of the need for urgent remedial action. However, it is expected that the safety margin with respect to embankment stability may be less than conventional limits. The spillway, founded on ledge rock, does not exhibit movement or displacement which would cause the stability of the structure to be questioned.
- b. Design and Construction Data - The drawings obtained from the City Engineer show the basic cross-section of the dam. However, there is virtually no information relative to the engineering properties of the embankment materials or seepage conditions within the embankment. In the absence of these data, it cannot be assumed that the safety factor for static stability of the downstream slope is greater than the minimum acceptable safety factor of 1.5 as recommended by the Guidelines. No construction data is available on the original construction of the spillway, nor is data available on the 1948 modification to this spillway. The structural adequacy of the spillway must be based on the visual inspection.
- c. Operating Records - Except for the apparently satisfactory performance of the facility since its completion in 1897, there are no operating records available to aid in the evaluation of structural stability.
- d. Post-Construction Changes - The spillway was modified in 1948, and a concrete inlet and an overflow pipeline to Mount Williams Reservoir were added in approximately 1915. However, there are no known modifications which affect the stability of the embankment.
- e. Seismic Stability - Notch Reservoir Dam is located in Seismic Zone 2 and, in accordance with recommended Phase I Guidelines, does not warrant seismic analysis.

Surcharge storing of the test flood inflow resulted in a peak test flood outflow of 5,275 cfs at a stage of 1238.5 feet. The routed outflow would overtop the dam by 1.5 feet. These values are based on no flashboards in place at the spillway, all valves on the outlet pipes in the closed position and the overflow to Mount Williams Reservoir blocked by stoplogs. If the outlet valves were open and the stoplogs removed from the entrance to the overflow to Mount Williams Reservoir, the discharge capabilities at Notch Reservoir with the water surface at top of dam would be increased by approximately 760 cfs.

- f. Dam Failure Analysis - Based on Corps of Engineers Guidelines for Estimating Dam Failure Hydrographs, and assuming that a failure would occur along 40 percent of the length (128 feet) of the dam structure, the peak failure outflow is estimated to be 100,000 cfs. As a result of a dam failure several houses and roads would be affected by high velocity flows due to the steep downstream channel. The caretaker's home, located at the toe of the dam, would be directly in the path of the floodwaters. About 600 feet downstream of the dam, West Mountain Road would be overtopped; 600 feet further downstream Reservoir Road would be overtopped for a length of about 2200 feet while two houses located along Reservoir Road would be affected. In the area near Notch Road, located about 9,200 feet from the dam, there is considerable development. Notch Road would be overtopped by 5 to 6 feet. State Route 2, about 1200 feet downstream of Notch Road would also be overtopped. Over 70 houses would be affected between State Route 2 and the Notch Road area. Beyond State Route 2 the peak failure outflow would join the Hoosic River, where a potential would exist for further loss of property and life. According to flood protection improvements to the Hoosic River in the City of North Adams, the "Hoosic River at Braytonville (located just upstream of the point where the Notch Reservoir floodwaters join the Hoosic River) has a capacity of 21,000 cfs... .. The freeboard for levees and walls.....is at least three feet above the water surface at the design flood". However, the dam failure peak flow of 100,000 cfs would overtop the flood walls. Accordingly, this dam is classified as having a "high" hazard potential.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

- a. General - Notch Reservoir is a water supply dam consisting of a 584 ft. long embankment approximately 60 ft. high and located on Notch Brook in the City of North Adams. The reservoir has a water surface area of approximately 11 acres at spillway crest elevation (1230.9 local datum) and an estimated storage capacity of 205 acre-feet at spillway crest. The dam is an earth embankment with a core wall. The spillway is located at the right end of the dam with provisions for 2 feet of flashboards along the crest. During peak discharges the crest length is approximately 36 feet. The spillway is founded on natural ledge and the discharge cascades over ledge to the toe of the dam. Notch Brook conveys the discharge approximately 2 miles to the Hoosic River. A 36-in. diameter overflow supply conduit conveys water from the left end of the dam to Mount Williams Reservoir which is located approximately 6,000 feet to the northeast.
- b. Design Data - There is no hydraulic/hydrologic design data available for this dam, except for a reservoir stage-storage relationship chart.
- c. Experience Data - No records of past floods are available for the dam site.
- d. Visual Observations - The visual inspection of the dam and reservoir was made on 30 April 1979. At that time, one 1-foot high flashboard was present in the 8'-5" center-section of the spillway, and the water depth over the spillway crest on either side of the center section was approximately 3 1/2 inches. The spillway approach channel had a water depth of 2 feet. The spillway was in good hydraulic condition. The spillway discharge channel has sufficient drop to ensure that the tail-water would not flood out the spillway weir.
- e. Test Flood Analysis - Based on the Corps of Engineers Guidelines, the recommended test flood for the size (intermediate) and hazard potential (high) is a full PMF (Probable Maximum Flood). The PMF was determined during the Corps of Engineers Guidelines for Phase I Dam Safety Investigations. The drainage area terrain is steeply sloped with heavy forest cover. Therefore, a peak inflow rate of 2,515 cfs per square mile was selected, which results in a test flood inflow of 5,575 cfs for the 2.2 square mile drainage area.

SECTION 4: OPERATIONAL PROCEDURES

- 4.1 Procedures - In general, there is no written procedure for the operation of the dam.
- 4.2 Maintenance of the Dam - The caretaker of the dam lives at the site and maintains the facility. However, there is no written formal procedure for the maintenance of the dam.
- 4.3 Maintenance of Operating Facilities - The dam is visited once a day by the Operator. Flashboards at the spillway and stoplogs at the overflow structure are adjusted to regulate the flow to Mount Williams Reservoir. Maintenance of the operating facilities is performed on the basis of need.
- 4.4 Description of Any Warning System in Effect - There is no established warning system or emergency preparedness plan in effect for this structure.
- 4.5 Evaluation - Formal operational procedures, maintenance programs, warning systems and emergency preparedness plans should be established for this dam.

The gatehouse at the toe of the dam is generally in good condition. The interior of the structure requires maintenance in the form of replacing loose and missing boards from the ceiling, renailing of floor boards, removing debris from the basement, and renewing rusted electrical fittings. The two 30" outlet pipes, one 20" outlet pipe and the valves in the basement are exhibiting a good deal of surface rusting. The rust should be removed and the surface coated to protect the pipes.

- d. Reservoir Area - Notch Reservoir, as the name implies, is in a mountain notch. The area is undeveloped. The heavily forested steep mountainsides to the reservoir and the upstream portions of Notch Brook form the drainage area for the reservoir. Although the side slopes are steep, there is no observed significant potential for landslides into the pond which would create waves that might overlap the dam. No conditions were noted that would result in a sudden increase in sediment load into the pond.
- e. Downstream Channel - Notch Brook which connects Notch Reservoir to the Hoosic River in the City of North Adams, Massachusetts, flows on a steep gradient down a mountain notch until it is approximately 2,000 feet from the Hoosic River. The slope flattens in this area as the brook runs through the developed area along the shore of the river. Notch Brook downstream of Notch Reservoir is primarily a mountain brook with steep gradients and cascades as it flows along a rocky channel in a forested area.

3.2 Evaluation - The present performance of the earth embankment appears to be generally satisfactory. However, the 1.5H to 1V downstream slope is steep compared to slopes of similar structures designed according to current engineering practice. Therefore, the safety margin with respect to embankment stability may not be within conventional limits.

Although the observed evidence of seepage and local surficial slope movement are not considered serious at this time, changes in the pattern or amount of seepage or continued slope movements could indicate the development of problems within the embankment. Furthermore, the relatively steep downstream slope increases the potential for embankment failure in the event that adverse seepage conditions or excessive slope movements were to develop.

The present condition of the spillway, intake structure for the overflow to Mount Williams and the outlet gatehouse in general appear to be in satisfactory condition. However, all the structures do require some maintenance work as delineated in Section 7.

gatehouse pond was noted on the right bank and from a pipe at the base of a masonry wall on the left. Rust staining was present in the pond, but no evidence of soil particle movement was discernible. Slight seepage was also noted to be flowing over rock which outcrops in the right abutment near the embankment contact. No evidence of soil movement was noted.

There was no obvious visual evidence of lateral movement, tilting or settlement of the spillway at the right abutment of the dam. The major portion of the spillway is bounded by or founded on natural ledge rock, minimizing the potential for movement or settlement. The spillway, therefore, in general is in good condition, but minor deficiencies were noted.

The following specific items were noted during the site examination:

- (1) Young trees overhang the spillway and downstream channel as shown in Photos 6 and 7.
- (2) The downstream end of the spillway left side wall has lost a good portion of its mortar bed as shown by Photo 7.
- (3) The cement mortar cap at the top of the left side wall is cracked, and it has a few minor spalls.

- c. Appurtenant Structures - The spillway discharge channel is cut into rock and extends around the right abutment. The exposed rock appears to be a schist with foliation dipping steeply to the west. The channel sideslopes are steep, irregular, and overgrown with trees (up to about 15 in. diameter). Some local ravelling of side slopes was noted but no evidence of significant instability was observed.

The concrete intake structure at the left abutment of the dam for the overflow pipeline to Mount Williams Reservoir is in fair condition. Efflorescence is present on the exterior face of the structure at the left side. There is general surface deterioration, primarily the loss of laitance, in the top concrete surface of the intake structure. Leakage is present around the stoplogs within the structure. The major source of leakage is a spalled concrete pier between the two sets of stoplogs. The spalled area is allowing water to flow between the stoplog guide channel and the concrete.

SECTION 3: VISUAL INSPECTION

3.1 Findings

- a. General - The Phase I visual examination of Notch Reservoir Dam was conducted on 30 April 1979.

In general, the earthen embankment, spillway and gatehouse were observed to be in fair condition. The reservoir level at the time of the site examination was 1.3 feet above the weir crest.

Checklists are available in Appendix A, selected photographs in Appendix C.

- b. Dam - Visual observations indicate that the performance of the earth embankment is, at present, generally satisfactory. However, in view of the steep downstream slope and lack of construction and design data, the condition of the embankment can be considered only fair.

The visible portion of the upstream slope has riprap, consisting of cobbles and boulders up to about 2 ft. in size, and extending to within about 1 ft. of the crest. The riprap is overgrown with grass and knee-high weeds as shown by Photo 3. Riprap coverage appears incomplete near the left abutment.

The crest has a good grass cover and is mowed. There is a slight rutting in wheel tracks as shown by Photo 2. The crest appears to be bowed slightly downstream and may vary up to 0.5+ ft. elevation.

The downstream slope is relatively steep, at 1.5H to 1V and is covered by grass, weeds, and some brush, as shown by Photo 5. There is an apparent bulge about 50 ft. wide at the base of the slope to the left of the gatehouse. The slope is somewhat irregular in this area, indicating that some surficial sloughing may have occurred. No evidence of recent instability was observed.

Evidence of seepage was noted at the toe, near the gatehouse. The ground was generally wet at the toe, to the left side of the gatehouse (below bulge at toe), and water was observed to be at the surface in small holes and in small diameter pipes driven into the slope in this vicinity. Slight flow into the

SECTION 2: ENGINEERING DATA

- 2.1 Design Records - The only design records located were reprints of a plan, section and profile of the dam. No plans were located showing the spillway configuration.
- 2.2 Construction Records - Other than 4 plans showing progress of the construction of the core wall and earth fill, no construction records were located.
- 2.3 Operation Records - No operational records other than County and State inspection reports were located.
- 2.4 Evaluation
 - a. Availability - Documents described above are available at the City Engineers Office, City of North Adams, Massachusetts.
 - b. Validity - The general configuration of the dam as shown on the design plans is in good agreement with the configuration observed in the field.
 - c. Adequacy - The available data, in combination with the visual inspection described in the following section, is adequate for the purposes of the Phase I investigation.

- (3) Height-----60 ft
- (4) Side slopes-----2H:1V U/S, 1.5H:1V D/S
- (5) Top-----12 ft
- (6) Zoning-----"Select Material" U/S
"Coarse Material" D/S
- (7) Impervious Core--"Rubble-core-wall" and "puddle wall"
- (8) Cutoff-----Core wall probably to ledge
- (9) Grout Curtain-----Probably none

h. Diversion and Regulating Tunnel -----None

i. Spillway

- (1) Type-----stone slabbed broad crested
weir with flashboards
- (2) Length of weir-----36 feet
- (3) Crest elevation-----1230.9
- (4) Gates-----None
- (5) U/S Channel-----Notch Reservoir
- (6) D/S Channel-----Natural channel which
cascades over ledge to
toe of dam.

j. Regulating Outlets

- (1) Reservoir Drains - Two 30-in. outlet pipes and one 20-in. blowoff pipe are located at the toe of the dam at the point of the dam's maximum height. Discharge through the pipes is controlled by hand operated valves located in the gatehouse at the toe of the dam. The invert elevation of the pipes is roughly elevation 1177.
- (2) Overflow Structure - A 36-in. diameter overflow pipeline and intake structure is located at the left abutment of the dam. The intake structure has two 6 foot high by 6 foot wide inlets with provisions for stoplogs. The elevation of the stoplogs is regulated to allow the excess water to flow to Mount Williams Reservoir. The capacity with all stoplogs removed and Notch Reservoir at spillway crest is estimated to be 30 cfs.

- (4) Normal pool-----1231
- (5) Full flood control pool-----N/A
- (6) Spillway crest-----1230.9
- (7) Design surcharge (Original Design)-----Unknown
- (8) Top of dam-----1237
- (9) Test flood design surcharge-----Unknown

d. Reservoir (feet)

- (1) Length of test flood pool-----2,000
- (2) Length of normal pool-----1,200
- (3) Length of flood control pool-----N/A

e. Storage (acre-feet)

- (1) Normal pool-----205
- (2) Flood control pool-----N/A
- (3) Spillway crest pool-----205
- (4) Top of dam-----301
- (5) Test flood pool-----325

f. Reservoir Surface (acres)

- (1) Normal pool-----11
- (2) Flood-control pool-----N/A
- (3) Spillway crest-----11
- (4) Test flood pool-----16
- (5) Top of dam-----15

g. Dam

- (1) Type-----Earth embankment
- (2) Length-----584 ft

1.3 Pertinent Data - The USGS Quadrangle: Williamstown, Massachusetts, 1973, indicates a reservoir water surface elevation of 1246. The original design drawings for the dam indicate the crest of the dam at elevation 640; but references to elevations on the original plans are sparse. However, during the construction of the overflow structure to the Mount Williams Reservoir, Notch Reservoir was placed in the same reference datum as Mount Williams Reservoir. Both reservoirs serve as water supply sources to the City of North Adams and are thus related. Also, the Mount Williams Reservoir reference datum is adequately documented in that reservoir's construction drawings. Consequently, the Mount Williams Reservoir reference datum will be utilized in this report. Such a datum places the spillway crest of Notch Reservoir at elevation 1230.9.

a. Drainage Area - The drainage area tributary to the dam site is 2.2 square miles. The drainage area is steeply sloped, heavily forested and contains no development. Notch Reservoir accounts for approximately 0.7 percent of the total drainage area.

b. Discharge at Dam Site - There are no records of discharges at the dam site.

(1) Outlet works: Two 30 inch diameter drains and one 20" blowoff with combined capacity of 700 cfs with water surface at spillway crest elev.

(2) Maximum known flood at damsite-----Unknown

(3) Ungated spillway capacity at top of dam
1,200 cfs @ 1237 elev.

(4) Ungated spillway capacity at test flood elevation
1,800 cfs @ 1238.5 elev.

(5) Gated spillway capacity at normal pool elevation--N/A

(6) Gated spillway capacity at test flood elevation---N/A

(7) Total spillway capacity at test flood elevation
1,800 cfs @ 1238.5 elev.

(8) Total project discharge at test flood elevation
5,275 cfs @ 1238.5 elev.

c. Elevation (ft. above Local Datum)

(1) Streambed at centerline of dam-----1177.0

(2) Test flood tailwater-----1179

(3) Upstream portal invert diversion tunnel-----N/A

- c. Size Classification - The height of the dam is approximately 60 feet and the estimated storage capacity is 301 acre-feet at the top of the dam. According to the Guidelines established by the Corps of Engineers, the dam is classified in the intermediate category based on the height.
- d. Hazard Classification - The results of the dam failure analysis indicate that a flood wave resulting from a failure of the dam embankment would cause severe damage to five homes in the upper regions of Notch Brook and flooding of about seventy homes in the developed area near the confluence of Notch Brook with the Hoosic River. In that the potential loss of life would be more than a few, the dam is classified in the "high" hazard category.
- e. Ownership - The dam is owned by the City of North Adams. The owner is represented by Mr. Joseph Girardi, Commissioner of Public Works, 10 Main Street, City Hall, North Adams, MA 01247 (Phone 413/663-6765).
- f. Operator - Mr. Robert Galipeau, Superintendent of Water Department, is assigned responsibility for operation of the dam. His address is City Yard, Ashland Street, North Adams, MA 01247 (Phone 413/663-5510). The caretaker, Mervin Haas, lives at the dam and carries out the instructions of the operator. The phone number at Notch Gatehouse is 413/663-3195.
- g. Purpose of the Dam - Notch Reservoir Dam collects and stores water as part of the water supply system for the City of North Adams, Massachusetts.
- h. Design and Construction History - The dam was constructed during 1896-1897. The designer was David M. Green, Civil Engineer. The dam is reported to have replaced or supplanted a dam built in 1864. The spillway structure was increased in width in 1948 and had major repairs performed in 1964. A concrete overflow structure was built during the construction of the Mount Williams Reservoir Dam in approximately 1915. The overflow water is transmitted to Mount Williams Reservoir via a 36-in diameter gravity flow pipeline.
- i. Normal Operational Procedures - The dam is visited each day by the Operator. The caretaker of the dam lives at the site. The caretaker, upon instruction, inserts and removes flashboards at the spillway and overflow structure. Flashboards at the overflow structure are used to regulate the flow through a 36-inch pipe to the Mount Williams Reservoir. There is no written procedure for operation of the dam. The caretaker cuts the grass, removes brush and operates valves.

1.2 Description of Project

- a. Location - Notch Reservoir Dam is located on the south side of West Mountain Road adjacent to the Notch Road, Reservoir Road, and Greylock Mountain Road intersections in the City of North Adams, Massachusetts, as shown on the report's Location Map. The dam impounds the waters of Notch Brook approximately 2 miles upstream of its confluence with the Hoosic River. The coordinates for the dam are 73 degrees-08.2 minutes longitude and 42 degrees-40.3 minutes latitude.
- b. Description of Dam and Appurtenances - Notch Reservoir Dam consists of an earthen embankment approximately 584 feet long exclusive of the spillway and 60 feet high. It has a crest width of 12 feet. The upstream slope is 2 horizontal to 1 vertical while the downstream slope is 1.5 horizontal to 1 vertical. A "rubble core wall" is in place beneath the crest of the dam and probably extending to ledgerrock. A "puddle wall" was placed along the upstream face of the rubble core wall. "Select" material was used between the puddle wall and the upstream face while "coarse" material was used between the rubble core wall and the downstream face of the dam. The upstream face of the dam was paved with 8 to 12 inch thick boulders laid on sand bedding. The crest and downstream face of the dam was loamed and seeded. Two 30-inch waste pipes and one 20-inch water supply main were placed under the dam at the point of the dam's maximum height. An inlet structure for the pipes, believed to be constructed of timber, is located at the upstream toe of the dam. The gated waste pipes discharge at a gatehouse at the downstream toe of the dam. The 20-inch water supply main is gated within the same structure, but it continues down the valley as a 12-inch water transmission main.

A 36 foot wide, 6 foot deep masonry channel founded on ledge serves as the spillway. The channel contains a stone masonry sill with provisions for 2 ft. of flashboards. The structure is located at the right abutment of the dam. A concrete overflow structure for a gravity pipeline to Mount Williams Reservoir is located at the left abutment of the dam. The intake for this pipeline has two 6 foot high but 6 foot wide concrete inlets with provisions for stoplogs. The stoplogs are separated by a concrete pier.

The Owner should implement corrective measures as required, based on results of the above engineering evaluation.

7.3 Remedial Measures

a. Operation and Maintenance Procedures - The following remedial work should be undertaken by the Owner:

1. Cut grass and weeds on the embankment at least once a year to permit visual examination.
2. Restore riprap on upstream slope near the left abutment.
3. Remove the trees that overhang the spillway and the downstream channel.
4. Replace the mortar missing from the base of the left downstream wall of the spillway and repair the cracks and spalls at the top of the same stone masonry wall.
5. Remove the surface deterioration from the top of the intake structure for the overflow to Mount Williams Reservoir and resurface the structure.
6. Repair the spalled center pier within the intake structure for the overflow to Mount Williams Reservoir.
7. Provide maintenance to the outlet gatehouse including the repair of the wooden ceiling, repair to the timber flooring, removal of debris from the basement and the replacement of electrical fittings. Clean the outlet pipes and gates in the basement of the gatehouse of rust and provide a protective coating.
8. Due to the presence of seepage at the downstream toe of the dam, it is recommended that during periods of high reservoir levels and unusual heavy precipitation the Owner continue surveillance of the dam.
9. Establish a formal operational procedure and maintenance program.
10. Develop a formal emergency procedures plan and warning system in cooperation with local officials and institute a program of annual technical inspections.

7.4 Alternatives - There are no practical recommended alternatives.

APPENDIX A
INSPECTION TEAM ORGANIZATION AND CHECK LIST

Page No.

VISUAL INSPECTION PARTY ORGANIZATION

A-1

VISUAL INSPECTION CHECK LIST

Embankment: Dam
Spillway: Main Spillway
Spillway: Overflow (to Mt. Williams Reservoir)
Outlet Works:

A-2, A-3

A-4

A-5

A-6

VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

DAM: NOTCH RESERVOIR DAM

DATE: 30 APRIL 1979

TIME: 0830-1200

WEATHER: 60° F - 76° F - Clear Sky - Calm

WATER SURFACE ELEVATION UPSTREAM: 3-1/2" over top of weir; flashboards
in 32' long.

STREAM FLOW: $Q = CLH^{1.5} = (2.8) (32') (0.29') = 14 \text{ cfs} \pm$

INSPECTION PARTY:

1. Roger H. Wood - CDM
2. Joseph E. Downing - CDM
3. Peter L. LeCount - H & A
4. Douglas G. Gifford
5. John Critchfield

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Dam</u>		
2. <u>Spillway (Main)</u>	<u>R. Wood</u>	
3. <u>Spillway (Overflow)</u>	<u>R. Wood</u>	
4. <u>Outlet Works</u>	<u>R. Wood</u>	

PRESENT DURING INSPECTION:

1. Mr. Robert Galipeau - North Adams
2. _____
3. _____

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: NOTCH RESERVOIR DAM

DATE: 30 APRIL 1979

EMBANKMENT: _____

BY: PLL, JWC, DGG

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows	1. a. Grass, weeds, local brush & brambles. b. None observed. c. Cobble-sized to 2' X 2' riprap to approx. 1' below crest; gen'ly in good condition; almost totally covered by grass above water line; not complete coverage in area of left abut. d. None observed.
2. Crest a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Movement or Settlement	2. a. Grass b. None observed. c. None observed. d. Sl. rutting along wheel tracks.
3. Downstream Slope a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains	3. a. Grass, weeds, local brush & brambles. b. Apparently none recently; lower half of slope in center portion of dam is irregular, poss. due to past sloughing. c. None observed. d. 5-10 1" dia. holes in area near toe; most had patches of fresh soil @ surface. e. 50' wide bulge @ toe near center, projects max. 2'. f. Wet at toe in vicinity of bulge, with water near surface in several holes & near top in most of 11 small dia. pipes in slope; slight seepage over rock in rt. abut. slope close to contact w/downstream face; pond below gatehouse w/flow from pipe under stone mas. wall & slight flow from slope to rt. of gatehouse, both w/rust stain. g. None observed, no soil particles evident in seepage. h. Not known. i. Not known.
4. General a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems	4. a., b., c. Poss. sl. downstream bow

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: NOTCH RESERVOIR DAM

DATE: 30 APRIL 1979

EMBANKMENT: (cont'd)

BY: PLL, JWC, DGG

CHECK LIST	CONDITION
1. Upstream Slope <ul style="list-style-type: none"> a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows 	of crest (1' +), crest locally up to 6" low, but alignment gen'l looks ok. d. Good. e. None observed. f. Apparently minor. g. None known.
2. Crest <ul style="list-style-type: none"> a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Movement or Settlement 	
3. Downstream Slope <ul style="list-style-type: none"> a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains 	
4. General <ul style="list-style-type: none"> a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems 	

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: NOTCH RESERVOIR DAM

DATE: 30 APRIL 1979

SPILLWAY: MAIN SPILLWAY

BY: R. WOOD

CHECK LIST	CONDITION
1. Approach Channel a. General Condition b. Obstructions c. Log Boom etc.	1. a. Good-shallow-natural ledge. b. None observed. Some young tree overhang right side. c. None
2. Weir a. Flashboards b. Weir Elev. Control (Gate) c. Vegetation d. Seepage or Efflorescence e. Rust or Stains f. Cracks g. Condition of Joints h. Spalls, Voids Or Erosion i. Visible Reinforcement j. General Struct. Condition	2. a. Provisions for 24" in center section and 12" at ends. b. Flashboards only. c. None observed. d. Obscured by flow. e. Obscured by flow. f. None observed. g. Good. h. None observed. i. N/A j. Constructed of what appears to be large slabs of marble, no erosion noted good to excellent.
3. Discharge Channel a. Apron b. Stilling Basin c. Channel Floor d. Vegetation e. Seepage f. Obstructions g. General Struct. Condition	3. a. Natural ledge. b. Natural ledge. c. Natural ledge. d. Invert clear-young trees on banks. e. None observed. f. None observed. g. Good.
4. Walls a. Wall Location _____ (1) Vegetation (2) Seepage or Efflorescence (3) Rust or Stains (4) Cracks (5) Condition of Joints (6) Spalls, Voids or Erosion (7) Visible Reinforcement (8) General Struct. Condition	4. a. Right side-natural ledge. b. Left side-Entrance training wall & side wall of weir. (1) Moss & grass at top joints. (2) None observed. (3) None observed. (4) No major cracks. (5) Few top stones loose. (6) Erosion of base mortar D/S end of wingwell. (7) N/A (8) Wall is field stone masonry with mortar joints and surfaces parged, good condition - parge coat fair with few missing spots.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: NOTCH RESERVOIR DAM DATE: 30 APRIL 1979

SPILLWAY: OVERFLOW (to Mt. Williams Reservoir) BY: R. WOOD

CHECK LIST	CONDITION
1. Approach Channel a. General Condition b. Obstructions c. Log Boom etc.	1. a. Good-structure projects into pond. b. None floating debris (bark). c. 4-40" wide bar racks.
2. Weir a. Flashboards b. Weir Elev. Control (Gate) c. Vegetation d. Seepage or Efflorescence e. Rust or Stains f. Cracks g. Condition of Joints h. Spalls, Voids Or Erosion i. Visible Reinforcement j. General Struct. Condition	2. a. 2 stoplogs 6' lg. each b. See a. c. None. d. Cracked pier left side leaks considerable water. Eff. on exterior face left side. e. None observed. f. See d. g. OK. h. Surface deterioration general esp. left side at front. i. None observed. j. Fair.
3. Discharge Channel a. Apron b. Stilling Basin c. Channel Floor d. Vegetation e. Seepage f. Obstructions g. General Struct. Condition	3. N/A under ground pipe.
4. Walls a. Wall Location _____ (1) Vegetation (2) Seepage or Efflorescence (3) Rust or Stains (4) Cracks (5) Condition of Joints (6) Spalls, Voids or Erosion (7) Visible Reinforcement (8) General Struct. Condition	4. N/A

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: NOTCH RESERVOIR DAM

DATE 30 APRIL 1979

OUTLET WORKS: _____

BY: R. WOOD

CHECK LIST	CONDITION
1. Inlet a. Obstructions b. Channel c. Structure d. Screens e. Stop Logs f. Gates	1. a.-f. Inlet below U/S toe of dam - not visible.
2. Control Facility a. Structure b. Screens c. Stop Logs d. Gates e. Conduit f. Seepage or Leaks	2. a. Shingle roof excellent, wood exterior good. Cut stone masonry ext. good. Floor fair, ceiling poor (loose & missing boards) basement good debris on floor. b. None. c. None. d. 2-30" lines with gate and probably plug valves on each. 1-20" line with gate and bypass with additional gate. Each 30" line has small bypass on gate valves. e. Rusted. f. Basement has standing water on floor - no flow observed.
3. Outlet a. Structure b. Erosion or Cavitation c. Obstructions d. Seepage or Leaks	3. a.-d. Pipes discharge through building wall. Pipes have silt in invert. D/S channels has some debris (branches). Water flows from D/S ponds-appears to be partially from pipes left side and seepage from right pond embankment.
4. Mechanical and Electrical a. Crane Hoist b. Hydraulic System c. Service Power d. Emergency Power e. Lighting f. Lightning Protection	4. a. None. b. None. c. Manually operated gates. d. None. e. Cable-rusted single light & switch. Operable-single phase service. f. None.
5. Other	

APPENDIX B
ENGINEERING DATA

Page No.

DOCUMENTS

List of Available Documents	B-1
Description of Dam (by Mass. Div. of Waterways)	B-2
Description of Dam (by David M. Greene, Eng. 1896)	B-6

PRIOR INSPECTION REPORTS

<u>DATE</u>	<u>BY</u>	
October 24, 1968	County of Berkshire, Mass	B-7
June 14, 1971	Mass. Div. of Waterways	B-8
May 24, 1972	Mass. Div. of Waterways	B-9
March 25, 1974	Mass. Div. of Waterways	B-12
November 16, 1976	Mass. Div. of Waterways	B-15
July 18, 1978	Mass. Div. of Waterways	B-18

DRAWINGS

<u>NO.</u>	<u>TITLE</u>	
4.	Notch Brook Reservoir Dam North Adams, Mass. 1895	B-21
1. - 5.	Notch Dam, North Adams, Mass. May 1896	B-22
5.	Notch Brook Dam & Broad Brook Dam Gatehouse and Inlet Crib North Adams, Mass. 1895	B-27
	Overflow Structure at Notch Reservoir Dam Copied from Mt. Williams Reservoir Dam Plans Sheet 6 dated July 1914	B-28

LIST OF AVAILABLE DOCUMENTS

NOTCH RESERVOIR DAM

<u>DOCUMENT</u>	<u>LOCATION</u>
1. Pipe and Stop Walls, May, 1895	City of North Adams City Hall North Adams, MA 01247
2. Thirteen (13) Sheets Showing Proposed Locations for Notch Reservoir	City of North Adams City Hall North Adams, MA 01247

DESCRIPTION OF DAM

DISTRICT ONE.Submitted by R D JordanDam No. 1-2-209-9Date 5-24-72City/Town North AdamsName of Dam Notch Reservoir

1. Location: Topo Sheet No. 4-A.

Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year built: 1895. Year/s of subsequent repairs 1948

3. Purpose of Dam: Water Supply X. Recreational .
Irrigation . Other .

4. Drainage Area: 2.5 sq. mi. acres.

5. Normal Ponding Area: Acres; Avg. Depth .
Impoundment: 90 MG gals; acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir
i.e. summer homes etc.

7. Dimensions of Dam: Length 600'. Max. Height 50'.
Slopes: Upstream Face Rockface 3:1.
Downstream Face Earth 2:1.
Width across top 12'.

8. Classification of Dam by Material:
Earth . Conc. Masonry . Stone Masonry .
Timber . Rockfill . Other Earth-Concrete Core

9. A. Description of present land usage downstream of dam:
100 % rural; % urban.
B. Is there a storage area or flood plain downstream of dam which could
accommodate the impoundment in the event of a complete dam failure
Yes . No X.

L-169 A

DAM NO. 1-2-209-9.

10. Risk to life and property in event of complete failure.

No. of people 150.

No. of homes 30.

No. of Businesses 2.

No. of Industries 3.

No. of Utilities _____.

Railroads _____.

Other dams _____.

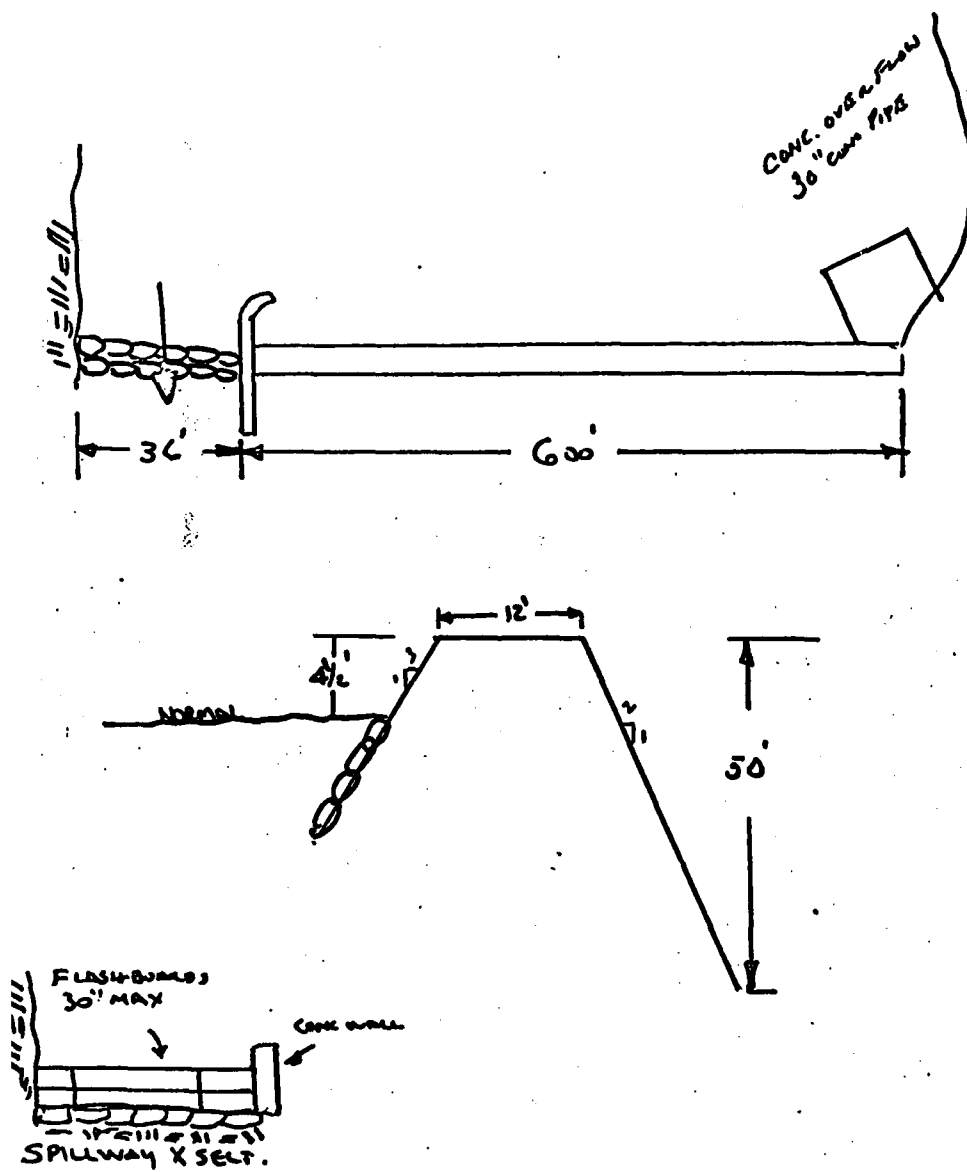
Other _____.

Type _____.

Type _____.

11. Attach Sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

NOTCH RESY. 1-2-209-9





L-168-A

DAM NO. 1-2-200-0

8. Downstream Face of Dam:

Condition: 1. Good x 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good _____ 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 0.2 above X below _____

top of dam _____

principal spillway X _____

other _____

11. Summary of Deficiencies Noted:

X Growth (Trees & Brush) on Embankment _____
_____ Animal Burrows and Washouts _____
_____ Damage to slopes or top of dam _____
_____ Cracked or damaged masonry _____
_____ Evidence of seepage _____
_____ Evidence of piping _____
_____ Erosion _____
_____ Leaks _____
_____ Trash and/or debris impeding flow _____
_____ Clogged or blocked spillway _____
_____ Other _____

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town NORTH ADAMS Dam No. 1-2-209-9
Name of Dam Notch Reservoir Inspected by RDJordan-RSpaniol
Date of Inspection July 18, 1978
Previous Inspection November 16, 1976

2. Owner/s per: Assessors _____
Reg. of Deeds _____ Personal Contact _____

1. City of North Adams City Hall North Adams, MA
Name St. & No. City/Town/State Tel. No.

2. _____
Name St. & No. City/Town/State Tel. No.

3. Caretaker (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name St. & No. City/Town/State Tel. No.

4. No. of Pictures taken 1

5. Degree of Hazard: (If dam should fail completely)*

1. Minor 2 Moderate X

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual _____
Operative X Yes _____ No _____

Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

2. Remarks & Recommendations: [Fully Explain] PREVIOUS INSPECTION DATE: March 25, 1974

All brush has been removed from the embankment; and no sloughing or settlement was noted. The toe is dry and firm.

The spillway has been repointed and is in good condition. This structure is well maintained and appears to be safe.

For location see topo Sheet 4-A.

13. Overall Condition:

1. Safe X
2. Minor repairs needed
3. Conditionally safe - major repairs needed
4. Unsafe
5. Reservoir impoundment no longer exists [explain]
Recommend removal from inspection list

1. Location: City/Town _____ Dam No. _____

Name of Dam _____ Inspected by: _____

Date of Inspection _____

2. Owner/s: per: Assessors _____ Prev. Inspection _____

Reg. of Deeds _____ Pers. Contact _____

1. _____
Name St. & No. City/Town State Tel2. _____
Name St. & No. City/Town State Tel3. _____
Name St. & No. City/Town State Tel. no.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners. 0.4*

Name St. & No. City/Town State Tel. No. X

4. No. of Pictures taken _____

5. Degree of Hazard: [if dam should fail completely]* emergency spillway

1. Minor _____ 2. Moderate _____

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic _____ Manual _____

Operative _____ yes: _____ no: _____

Comments: _____

upstream face of Dam: Condition: _____

1. Good _____ 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

INSPECTION REPORT - DAMS AND RESERVOIRS

Location: City/Town NORTH ADAMSDam No. 1-2-209-9Name of Dam Notch ReservoirInspected by RD Jordan-RS SpaniolDate of Inspection 11-16-76

2. Owner/s: per: Assessors _____
 Reg. of Deeds _____ Pers. Contact _____
 Prev. Inspection X

1. City of North Adams City Hall North Adams 01247
 Name St. & No. City/Town State Tel

2. _____
 Name St. & No. City/Town State Tel

3. _____
 Name St. & No. City/Town State Tel. no.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

_____ Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken 1

5. Degree of Hazard: [if dam should fail completely]*

1. Minor _____ 2. Moderate X

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic _____ Manual X
 Operative X yes: _____ no.

Comments: _____

upstream face of Dam: Condition:

1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

12. Remarks & Recommendations: [Fully Explain]

The City is presently clearing the brush on the downstream slope. The slope appears to be in good condition. There is no evidence of sloughing, settlement or seepage.

The top of the embankment and upstream face are in good condition.

The spillway looks good. The leaks reported in previous reports were not visible due to low water storage.

The dam appears to be in sound condition and in my opinion it is safe.

A description of the structure was submitted in 1972.

There are no changes to be noted.

For location see Topo Sheet 4-A.

13.

Overall Condition:

1. Safe ☒ _____.
2. Minor repairs needed _____.
3. Conditionally safe - major repairs needed _____.
4. Unsafe _____.
5. Reservoir impoundment no longer exists [explain]
Recommend removal from inspection list _____.

8.

Downstream Face of Dam: Condition: 1. Good X, 2. Minor Repairs____,
3. Major Repairs____ 4. Urgent Repairs____.

Comments: _____

9.

Emergency Spillway: Condition: 1. Good____, 2. Minor Repairs____,
3. Major Repairs____ 4. Urgent Repairs____.

Comments: _____

10.

Water level @ time of inspection: 1.0 ft. above____, below X____,
top of dam____,
principal spillway X____,
other____.

11.

Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment	<u>None</u>
Animal Burrows and Washouts	<u>"</u>
Damage to slopes or top of dam	<u>"</u>
Cracked or Damaged Masonry	<u>"</u>
Evidence of Seepage	<u>"</u>
Evidence of Piping	<u>"</u>
Erosion	<u>"</u>
Leaks	<u>"</u>
Trash and/or debris impeding flow	<u>"</u>
Clogged or blocked spillway	<u>"</u>
Other	<u>"</u>

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town ~~XXXX~~ North Adams. Dam No. 1-2-209-9.
 Name of Dam Notch Reservoir. Inspected by: RJordan-RP State.
 Date of Inspection 3/25/74.

2. Owner/s: per: Assessors_____. Prev. Inspection X.
 Reg. of Deeds_____. Pers. Contact_____.

1. City of North Adams - City Hall - North Adams, MA 663-3455
 Name St. & No. City/Town State Tel. No.

2. _____
 Name St. & No. City/Town State Tel. No.

3. _____
 Name St. & No. City/Town State Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

_____ Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken 4.

5. Degree of Hazard: [if dam should fail completely]*

1. Minor_____. 2. Moderate X_____.

3. Severe_____. 4. Disastrous_____.

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic_____. Manual X_____.
 Operative X yes:_____ no.

Comments:_____

upstream face of Dam: Condition:

1. Good X_____. 2. Minor Repairs_____.

3. Major Repairs_____. 4. Urgent Repairs_____.

Comments:_____

12. Remarks & Recommendations: [fully Explain]

The leaks between the ledge and spillway noted in the 1971 report have not as yet been repaired. The stone blocks are securely fastened to the ledge, and the leaks are minor. However, to prevent possible ice damage in the future some grouting should be done. The slopes are stable and there is no settlement in the embankment. There is some brush to be removed in the vicinity of the spillway. The toe of the embankment is dry, no sign of leaks or seepage.

The dam appears to be in sound condition.

13. Overall Condition:

1. Safe X
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____
4. Unsafe _____
5. Reservoir impoundment no longer exists [explain]
Recommend removal from inspection list _____

8. Downstream Face of Dam: Condition: 1. Good X 2. Minor Repairs_____
3. Major Repairs____ 4. Urgent Repairs_____

Comments: _____

9. Emergency Spillway: Condition: 1. Good X 2. Minor Repairs_____
3. Major Repairs____ 4. Urgent Repairs_____

Comments: _____

10. Water level @ time of inspection: _____ ft. above____ below____
top of dam_____
principal spillway_____
other @ top of flash boards_____

11. Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment X_____
Animal Burrows and Washouts NONE_____
Damage to slopes or top of dam "_____
Cracked or Damaged Masonry "_____
Evidence of Seepage "_____
Evidence of Piping "_____
Erosion "_____
Leaks "_____
Trash and/or debris impeding flow "_____
Clogged or blocked spillway "_____
Other "_____

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town North Adams. Dam No. 1-2-209-9.
Name of Dam Notch Reservoir. Inspected by: R.D.Jordan.
Date of Inspection 5-24-72.

2. Owner/s: per: Assessors _____. Prev. Inspection X.
Reg. of Deeds _____. Pers. Contact _____.

1. City of North Adams - City Hall - North Adams, MA 663-3455
Name St. & No. City/Town State Tel. No.

2. _____
Name St. & No. City/Town State Tel. No.

3. _____
Name St. & No. City/Town State Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.
Genesio Breda - City Hall - North Adams, MA 663-3455
Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken --.

5. Degree of Hazard: [if dam should fail completely]*
1. Minor _____. 2. Moderate _____.
3. Severe _____. 4. Disastrous X.
*This rating may change as land use changes [future development]

6. Outlet Control: Automatic _____. Manual X.
Operative X yes; _____ no.
Comments: _____

7. Upstream Face of Dam: Condition:
1. Good X. 2. Minor Repairs _____.
3. Major Repairs _____. 4. Urgent Repairs _____.
Comments: _____

INSPECTION OF DAMS

City or Town of North Adams Date June 14, 1971
 Name of Dam Notch Reservoir Inspector R. Northrup & P. Feggie
 Owner City of North Adams Address City Hall, North Adams, Mass.
 Caretaker City of North Adams Address City Hall, North Adams, Mass.
 Location East of intersection of Notch and Reservoir Roads.
 Type of Dimensions Earth, masonry core 600' long, 50' high, 12' wide on top.
 Spillway, type and size Masonry 36' wide, 5½' freeboard built on ledge.
 Outlets, type and size Concrete overflow; 2(6' high X 6½' wide) flashboards to 30" conc. pipe.
 Flashboards, type and height 12" wood.
 Date Built 1895 Condition Good except as noted.
 When last repaired 1948 By whose orders County Commissioners.
 Nature of Repairs Spillway widened 36'.
 Purpose of Dam City water supply.
 Approximate storage of water 12,000,000 cubic feet.
 Approximate area of water shed 2.5 square miles.
 Possible damage due to failure of dam Disastrous to life below as several homes are at toe of dam.
 Remarks Leaks under spillway between ledge and spillway.
 Recommendations Seal leaks at spillway.
Corrective Action

COUNTY OF BERKSHIRE, MASS.

INSPECTION OF DAMS

1-2-209-9

City or Town of North Adams Date October 24, 1968
Name of Dam Notch Reservoir Inspector William A. Heaphy
Owner City of North Adams, Mass. Address City Hall, North Adams, Mass. Tel. _____
Caretaker Donald J. Gagne Address Notch Road, North Adams, Mass. Tel. _____
Location Below intersection of Notch Road and Reservoir Roads
Type and Dimensions Earth Masonry Core 600' long 50' high 12' wide on top

Spillway, type and size Masonry- 36' wide 5.5' freeboards
Outlets, type and size Two 30" and one 20" floodgates
Flashboards, type and height New - 12" boards
Date Built 1895 Condition Good
When last repaired 1948 By whose orders County Commissioners
Nature of Repairs Spillway widened 36'

Purpose of Dam City water supply
Approximate storage of water 12,000,000 cubic feet
Approximate area of water shed 2.5 Square Miles
Possible damage due to failure of dam Roads and property in Braytonville.

Remarks Water about 5' below spillway flashboards in place. Heavy growth, both upstream and downstream embankments

Recommendations Growth should be removed each year.

REPORT OF BOARD OF PUBLIC WORKS.

149

REPORT OF ENGINEER OF NOTCH RESERVOIR.

TO THE BOARD OF PUBLIC WORKS, NORTH ADAMS, MASS.,

Gentlemen:

The "Notch" dam, having been accepted by the inspecting engineer, for the Board of County Commissioners, and by your engineer, it may be regarded as substantially completed. Moreover, the waste gates having been closed on the 9th day of November, and the water in the reservoir having risen to within about three feet of the ultimate flow line, without the slightest indication of leakage, through or under the dam, I feel that I am justified in reporting that the dam has not only been substantially completed but that, in all essential features, it has been satisfactorily completed. Only a few trifling additions, in the way of finish, will be necessary, after the ground shall have become settled in the spring.

The "Notch" dam is an earthen structure, 60 feet high, 584 feet long on top, with slopes of two to one and one and one-half to one, on the water and outside slopes, respectively, and is provided with core and puddle walls, the dividing plane between which passes through the inner top angle of the dam. The water slope is protected by a slope wall of boulders from eight to twelve inches thick.

The extent of territory draining into the "Notch" brook, above the dam, is estimated to be 2.2 square miles, while the average annual rainfall and run-off are assumed to be 40 inches and 20 inches, respectively.

A spill-way, 25 feet wide, is cut through the rock around the easterly end of the dam.

In determining the width and capacity of the spill-way, regard was had for the largest floods, in the brook, which have occurred within the recollection of Mr. Chase, aged about 80 years, who has lived all his life within 150 feet of the site of the dam.

Through the dam there are laid two 30-inch waste pipes and a 20-inch service pipe, the latter for the present being reduced, below the dam, and connected with a 12-inch pipe which has heretofore served to convey the water from the old reservoir to the higher of the two reservoirs near the city. This pipe has been in service since November 9th, when the waste gates were closed.

The ultimate flow line of the reservoir, at an elevation of 635 feet above Main street in North Adams, will enclose an area of between twelve and thirteen acres, while the capacity of the reservoir is, approximately, 90,000,000 United States gallons.

.....

In concluding this report, I desire to place on record a most cordial acknowledgment of my obligations to, and my entire confidence in Mr. H. M. Geer, who has been in immediate charge of the work, from the beginning, and who, by his ability and fidelity, has placed me under renewed obligations to him.

The members of your Board have my best thanks for their uniform courtesy toward me.

Respectfully submitted,

DAVID M. GREENE,
ENGINEER.

Troy, December 29th, 1896.

L-168B

DAM NO. 1-2-209-9

- 3 -

12. Remarks & Recommendations; (Fully Explain) .
PREVIOUS INSPECTION DATE: November 16, 1976

Except for light brush and weeds on both slopes the dam appears to be in good condition.

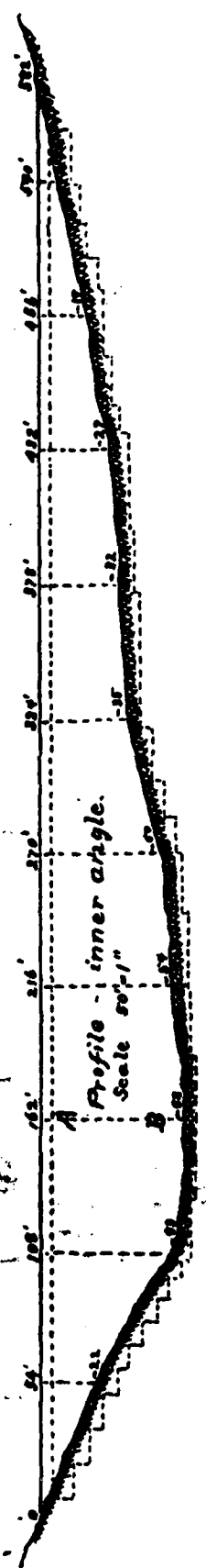
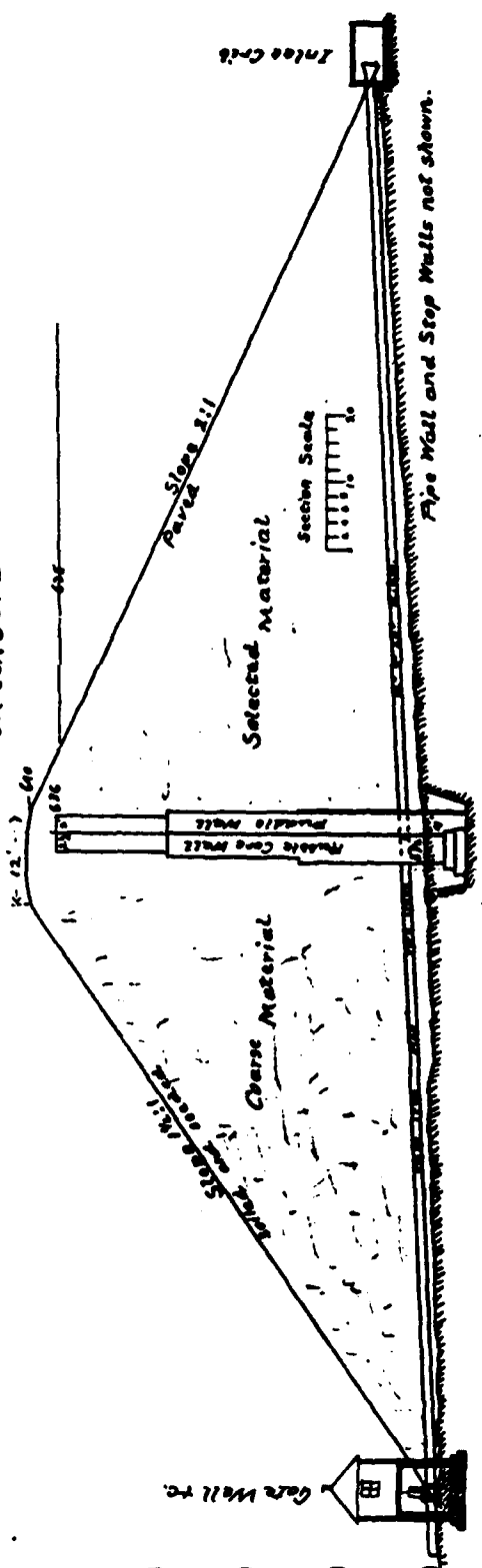
For location see Topo Sheet 4-A.

13. Overall Condition:

☒ 1. Safe _____
_____ 2. Minor repairs needed _____
_____ 3. Conditionally safe - major repairs needed _____
_____ 4. Unsafe _____
_____ 5. Reservoir impoundment no longer exists (explain)
Recommend removal from inspection list _____

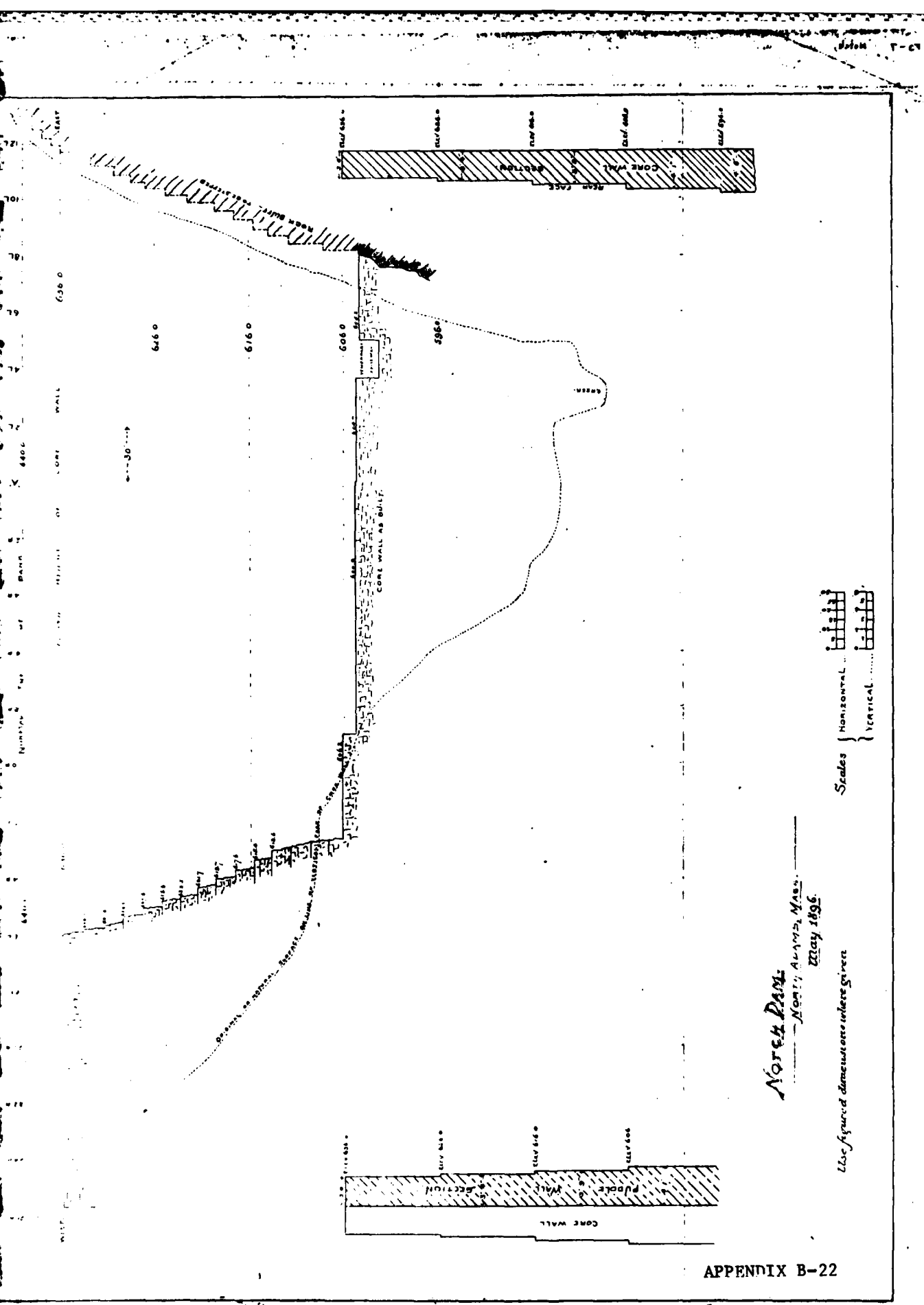
NOTCH BROOK RESERVOIR DAM
North Adams, Mass.
1895.

Maximum Section
on line A.B.



APPENDIX B-21

For — D. M. Greene, C.E.
— by — H. M. Geer, C.E.
(copied Oct. 1914 and)



Notch Dam

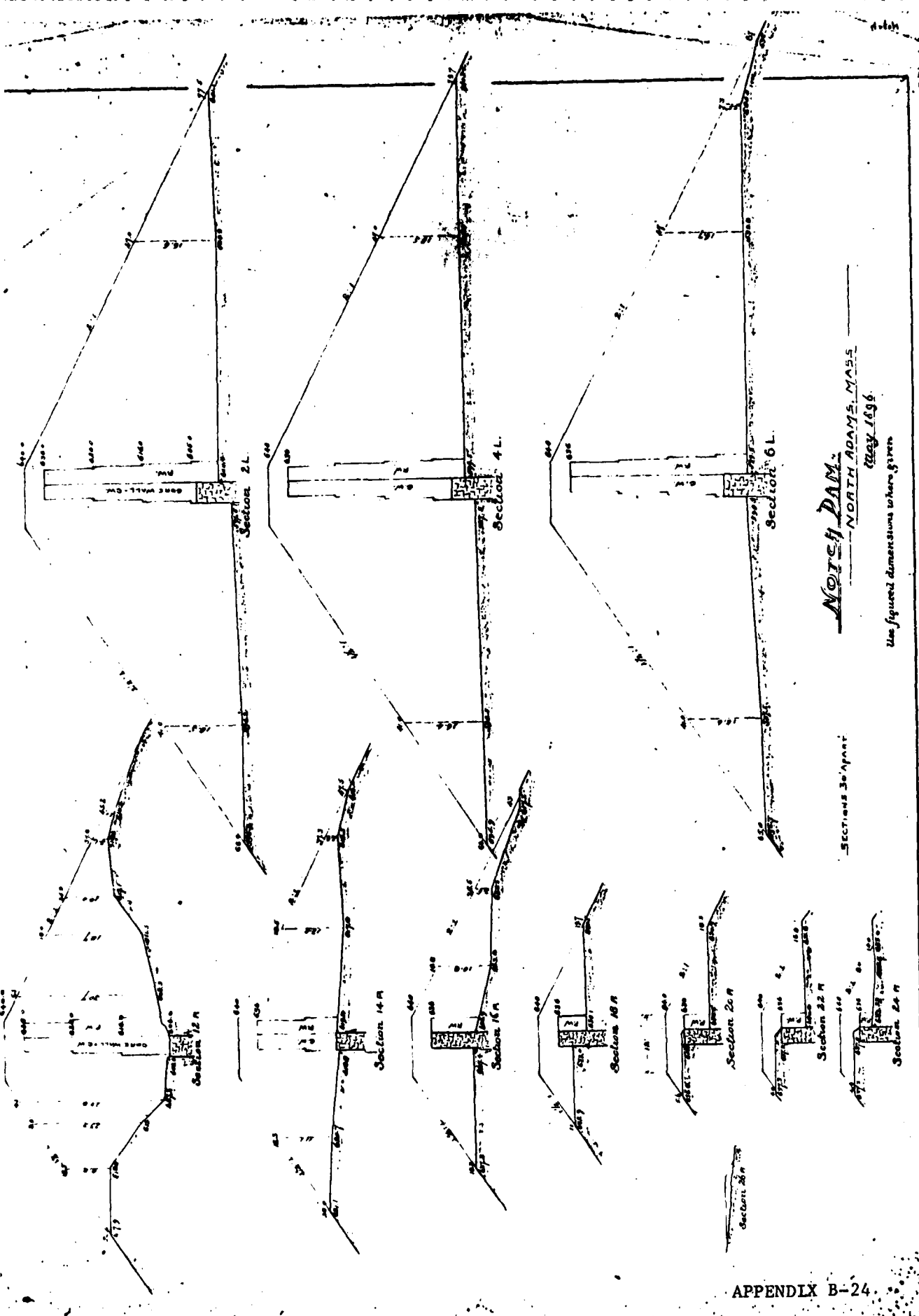
North Adams, Mass.

May 1896

Use figured dimensions



Sections to be repaired



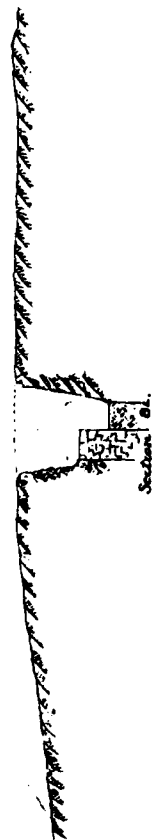
NOTCH DAM.
 NORTH ADAMS, MASS.
 May 1896
 Use figured dimensions where given

SECTIONS 30' APART

NOTICE

NORTH HUNTER, MISSISSIPPI

May 1896



Note: Sections 101 and 102 are 30 ft apart.

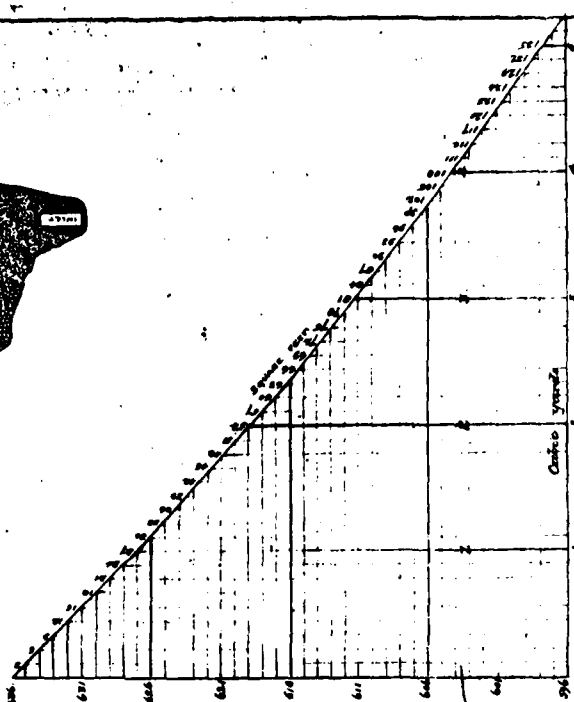
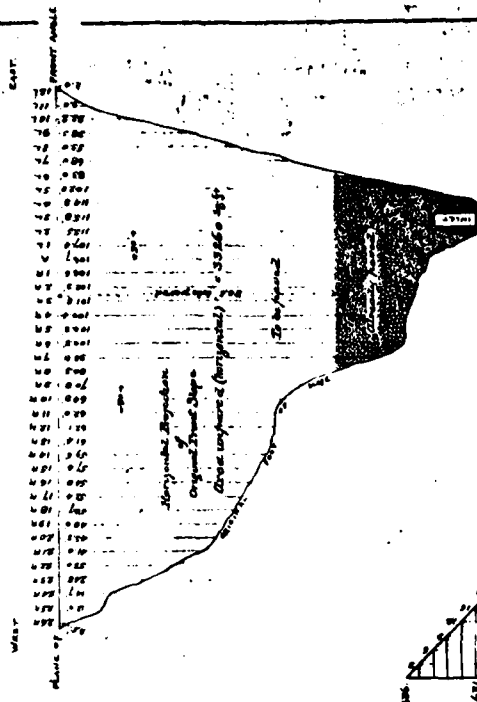
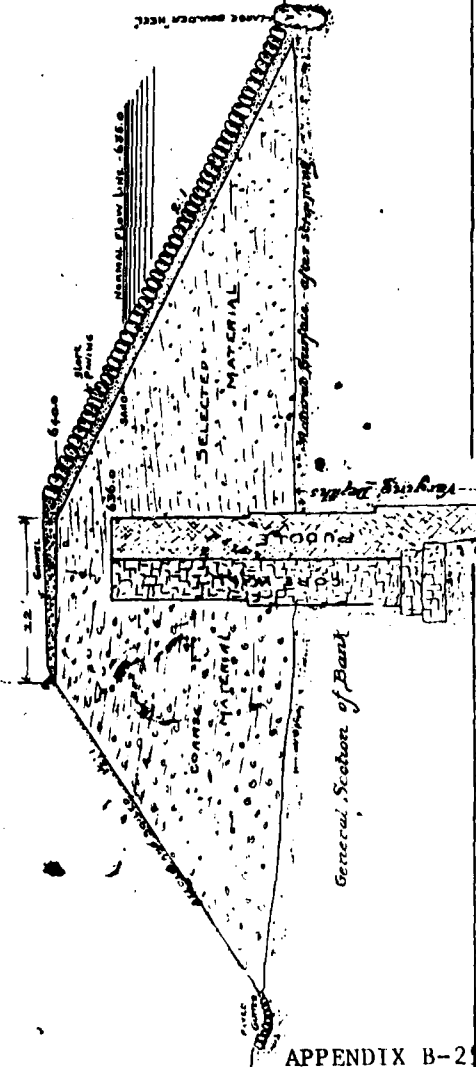
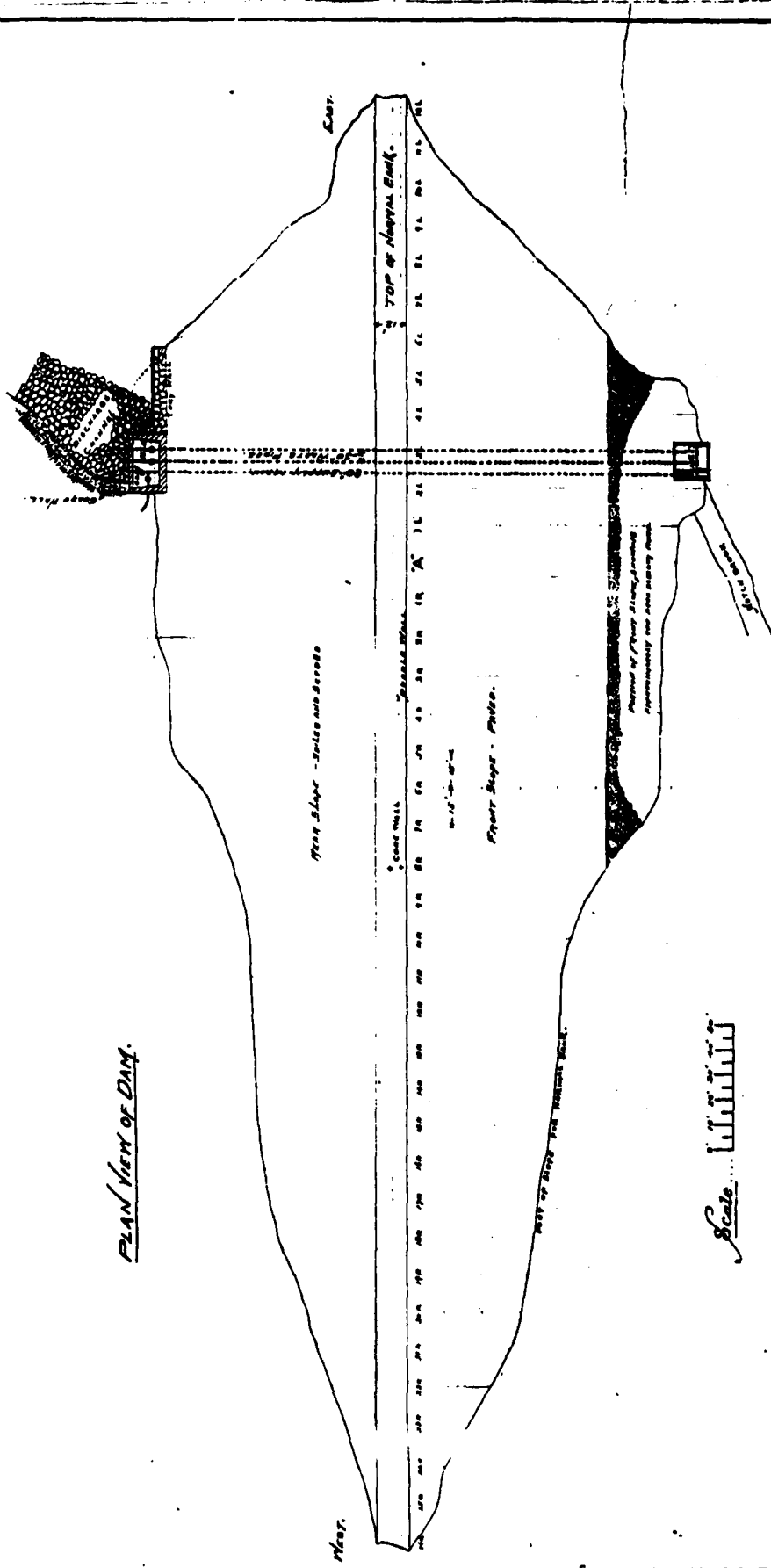


Diagram showing Volume per foot of length of Core Wall also Middle

NOTCH DAM

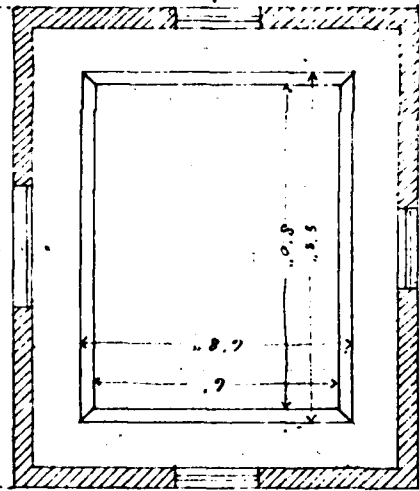
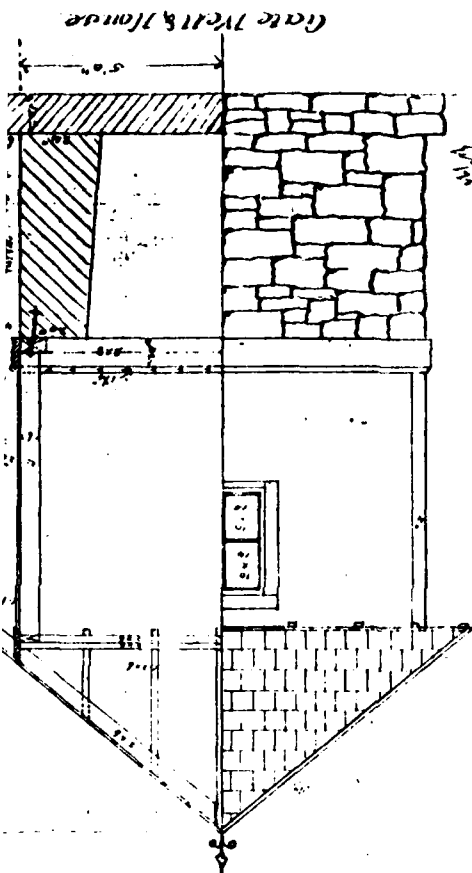
NORTH ADAMS, MASS.
MAY 1946.



PLAN VIEW OF DAM.

Scale

For Publ. Comm.



Capitulation and Inlet Crib

FOR

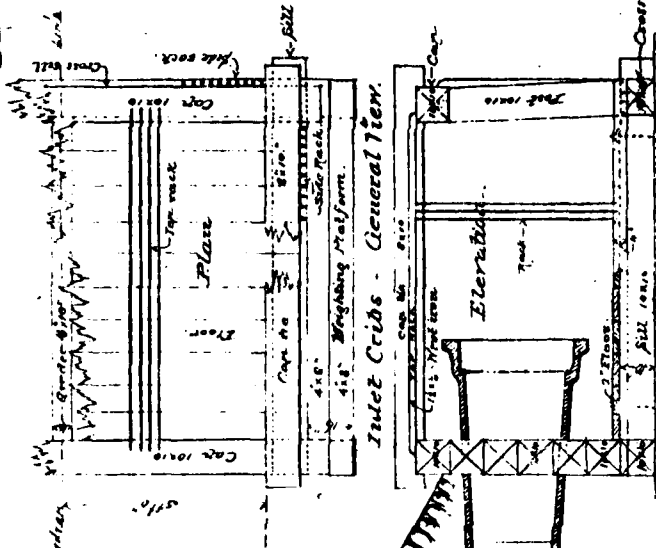
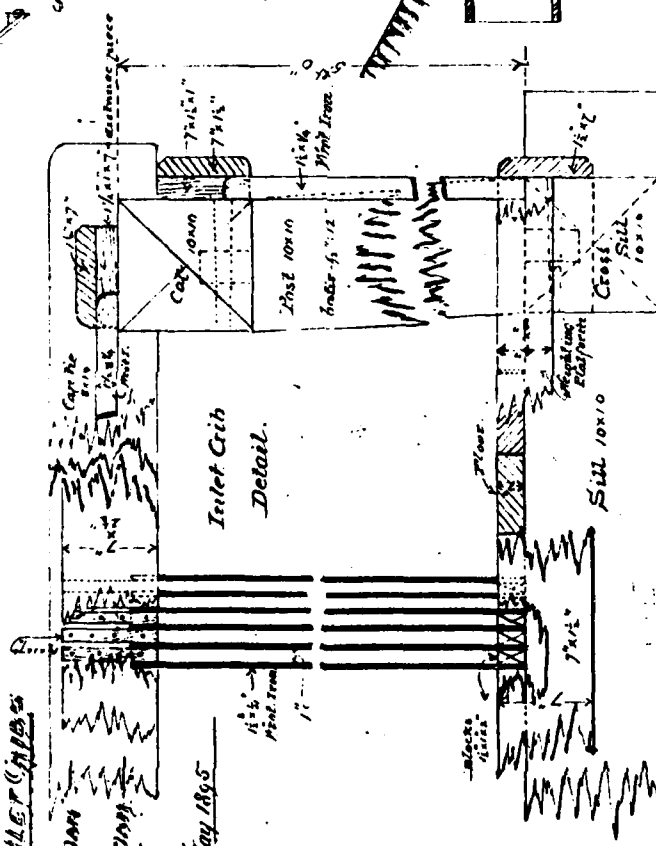
NOTED BY THE BOARD

AND

BY THE BOARD

North Atlantic, Mass.

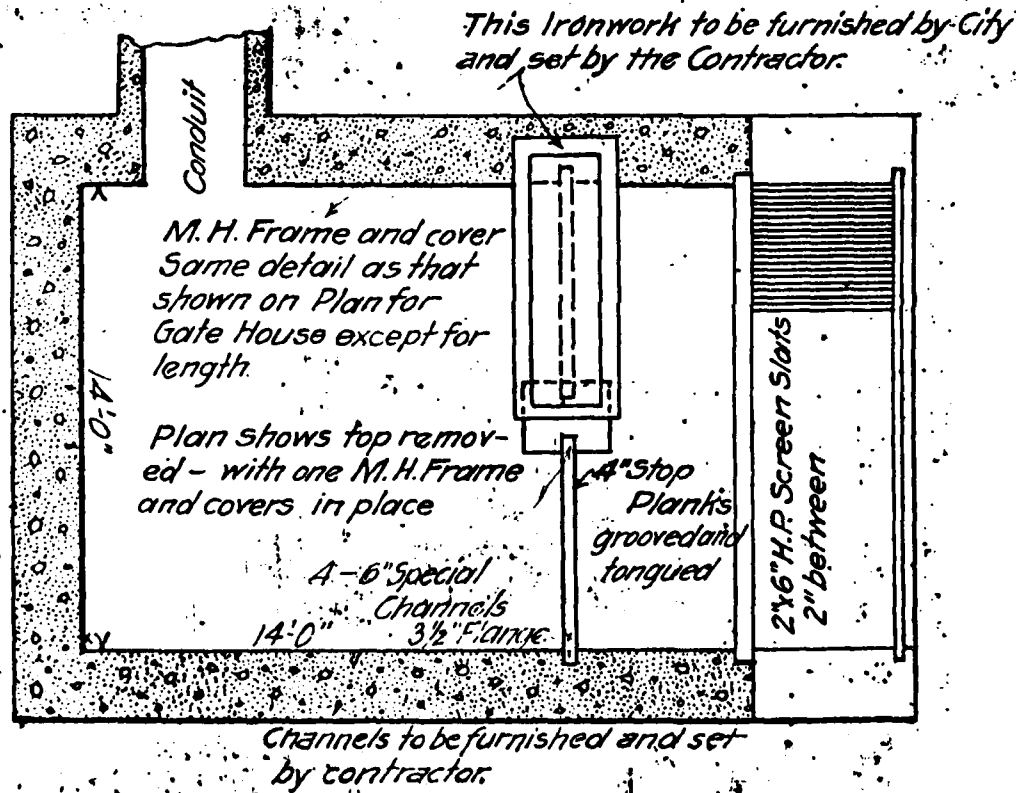
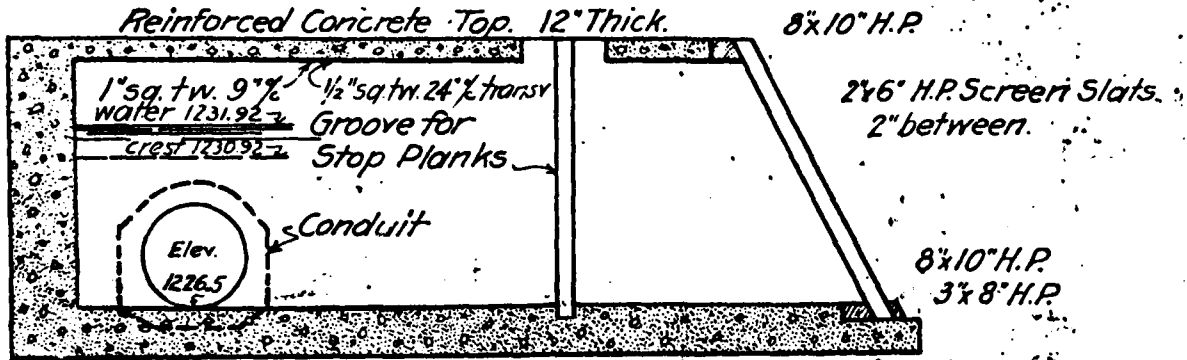
May 1895



For D. M. Greene, C.E.
by H. M. Geer, C.E.

DETAIL OF HEAD WORKS

Scale 1 inch = 4 ft.



OVERFLOW STRUCTURE AT NOTCH RESERVOIR DAM
 Copied from
 MT. WILLIAMS RESERVOIR DAM PLANS SHEET 6
 Dated July 1914

APPENDIX C

SELECTED PHOTOGRAPHS OF PROJECT

Page No.

CATION PLAN

Location of Photographs

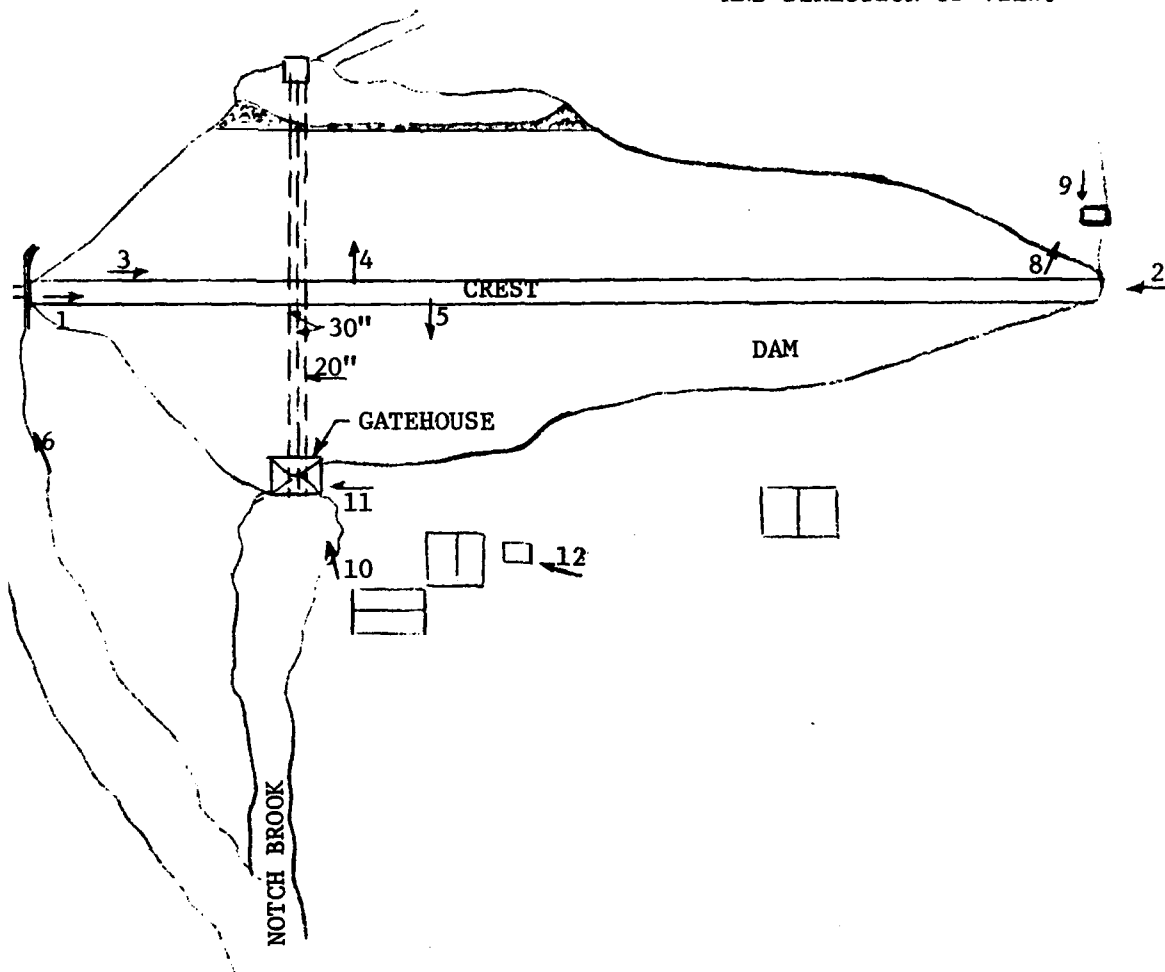
C-1

OTOGRAPHS

<u>No.</u>	<u>Title</u>	<u>Page No.</u>
	Overview of Dam From Right Abutment	iv
	Overview of Dam From Left Abutment	C-2
	Stone Paving at Upstream Face of Dam	C-2
	View of Reservoir Shoreline From Dam	C-3
	View of Downstream Topography From Dam	C-3
	View of Spillway From Downstream of Weir	C-4
	Left Sidewall of Spillway Downstream of Weir	C-4
	Intake Structure at Dam Left Abutment For	C-5
	Gravity Pipeline to Mount Williams Reservoir	
	Leakage Between Left Stoplog Guide and Center	C-5
	Pier in Intake for Pipeline to Mount Williams	
	Reservoir	
	Downstream Face of Gatehouse	C-6
	Interior of Gatehouse	C-6
	Gate Valve Stems for Water Supply Mains Located	C-7
	to the Left of Gatehouse	

NOTES:

1. PLAN BASED ON DESIGN PLAN AND CDM FIELD OBSERVATIONS
2. 1 DENOTES PHOTOGRAPH NUMBER AND DIRECTION OF VIEW.



CAMP DRESSER & MCKEE, INC.
BOSTON, MASSACHUSETTS

U.S. ARMY ENG. DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION OF PHOTOGRAPHS

NOTCH RESERVOIR

MASSACHUSETTS

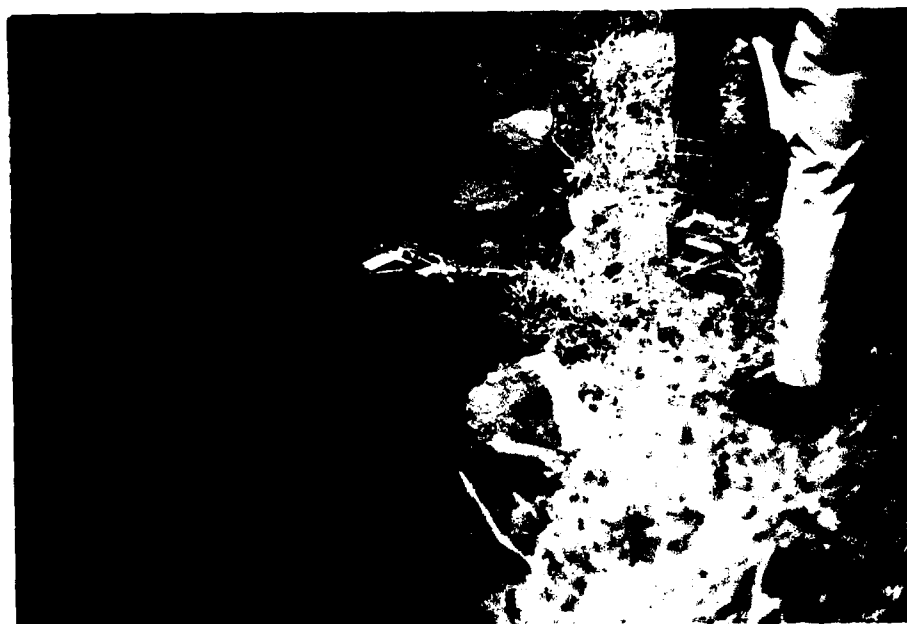
Scale; Not To Scale

Date; June 1979

APPENDIX C-1



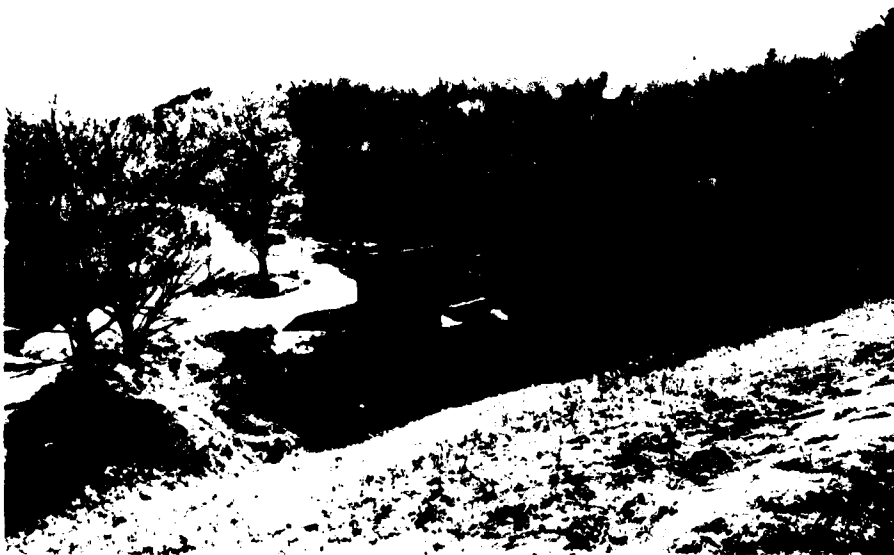
2. OVERVIEW OF DAM FROM LEFT ABUTMENT.



3. STONE PAVING AT UPSTREAM FACE OF DAM.



4. VIEW OF RESERVOIR SHORELINE FROM DAM.



5. VIEW OF DOWNSTREAM TOPOGRAPHY FROM DAM.



6. VIEW OF SPILLWAY FROM DOWNSTREAM OF WEIR.



7. LEFT SIDE WALL OF SPILLWAY DOWNSTREAM OF WEIR.

CLIENT Corps of Engineers
 PROJECT Dam Inspection
 DETAIL Notch Reservoir Dam
JOB NO. 380-G-RT-5DATE CHECKED 7/23/79CHECKED BY MDPAGE 8DATE 5-7-79COMPUTED BY Joe A.DAM FAILURE ANALYSISdetermine Q_p :

$$Q_p = \frac{8}{27} (W_b) (g)^{1/2} (Y_o)^{3/2}$$

 where: W_b = 40% of the dam width
 measured at the mid-height
 of the dam.
 $= 0.4 \times 320 = 128 \text{ ft}$

$$g = 32.2 \text{ ft/sec}^2$$

 Y_o = Hydraulic height at the
 time of dam failure. Assume
 WS @ dam crest elevation
 at time of failure = 60 ft.

$$Q_p = \frac{8}{27} (128) (32.2)^{1/2} (60)^{3/2}$$

$$= 100,000 \text{ cfs}$$

Route Dam Failure Flows

Downstream of Notch Reservoir Dam, Notch Brook is steep with essentially no bank storage. About 600-ft downstream of the dam, West Mountain Road crosses the brook. A box culvert 3.5'H x 7.0'W with the crown 2-feet below roadway connects the rd to the d/s channel. About 600-ft further down, Reservoir Rd crosses the channel. Flow is carried under the road by a conduit with a 6'H x 3.5'W entrance and a 6'Ø steel outlet. Approx. 30-ft up of Reservoir Rd. is a rectangular opening 5'H x 6'W with provisions for stoplogs to create a small pool. The roadway at Reservoir Rd. is 1.0-ft above the crown of the culvert. Notch Road bridge crosses the brook about 9200-ft downstream of the reservoir. The bridge opening is about 8'H x 20'W with top of road about 1.5 ft above the crown of opening. About 1200 ft d/s of Notch Road, Rt. 2 crosses the brook over two box culverts measuring 5'H x 12'W each and joins the Hoosic River (see 'Dam Failure Impact Area' map for plan of d/s channel).

Both the West Mountain Road and the Reservoir Road crossings are hydraulically insignificant relative to the magnitude of the dam failure flow (area of opening = 25 ft² while $Q = 100,000 \text{ cfs}$). Practically all the dam failure flow will cross over the road. Even the bridge opening

CLIENT COE JOB NO 380-6-RF-5 PAGE 7A
 PROJECT Dam Imp. DATE CHECKED 8/23/79 DATE 8-23-79
 DETAIL Notes Reservoir CHECKED BY JED COMPUTED BY he H.

Condition II - W.S. El @ Test Flood Stage : 1238.5

a. Reservoir Drains Capacity

$$Q = 0.95 (2\pi 25^3/4) (64.4 (1238.5 - 1178.5))^{1/2} = 580 \text{ cfs}$$

b. Water Blowoff Capacity

$$Q = 0.95 (\pi (20/2)^2/4) (64.4 (1238.5 - 1177))^{1/2} = 130 \text{ cfs}$$

Total Outlet Works Cap. for Cond. II = 580 + 130 = 710 cfs

DIVERSION CONDUIT CAPACITY

Condition I - W.S. El @ Spillway crest : 1231

Based on USGS booklet titled "Measurement of Peak Discharge at Culverts by Indirect Methods" page 31

Diversion Conduit : 36" ϕ @ Δ inlet el. 1228, slope = 6.12%
 length = 2660 ft

$$h_1 = 1231 - 1228 + (2660) 0.0012 = 6.2 \text{ ft}$$

$$h_1/D = 6.2/3 = 2.07 \quad @ \quad 29n^2/R_0^{1/3} = 1, \quad Q/A_0\sqrt{D} = 5.3$$

$$29n^2/R_0^{1/3} = (29(0.013)^2 2660) / (6.75)^{1/3} = 19.1$$

$$\therefore K_f \approx 0.5 ; \quad Q = (5.3)(0.5) A_0 \sqrt{D} = 2.65 \times 7.07 \sqrt{3}$$

$$\text{Capacity} = 32 \text{ cfs}$$

Condition II - W.S. El @ Test Flood Stage : 1238.5

$$h_1 = 1238.5 - 1228 + 3.2 = 13.7'$$

$$h_1/D = 13.7/3 = 4.57 \quad @ \quad 29n^2/R_0^{1/3} = 1, \quad Q/A_0\sqrt{D} = 9.9$$

$$K_f = 0.5 \quad \therefore Q = 9.9 \times 0.5 \times 7.07 \sqrt{3} = 61 \text{ cfs}$$

TOTAL DISCHARGE - Outlet Works plus Diversion Conduit Capacity

Condition I, Discharge = 664 + 32 = 696 say 700 cfs

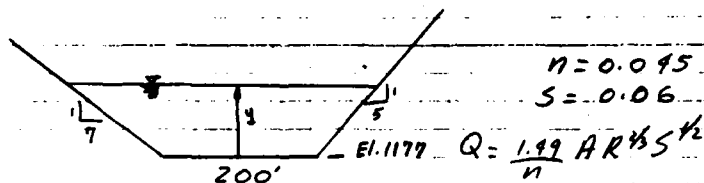
Condition II, Discharge = 710 + 61 = 771 say 770 cfs

Approx Total Discharge at top of Dam (elev. 1237) = $(771 - 696) \times \left(\frac{1237 - 1231}{1238.5 - 1231} \right)^{1/2} + 696 = 763$
 say 760 cfs

TAILWATER ANALYSIS

Determine Tailwater elevation @ Toe of Dam:

Approximate X-Section of toe of Dam:



Water Depth, y	Area, ft ²	Discharge, cfs
2	424	5,262

∴ if Peak outflow from Notch Reservoir is approx 5,275 cfs
 then Tailwater EL @ Toe of Dam $\approx 1179'$

No tailwater effects will influence discharge from the Reservoir.

OUTLET WORKS CAPACITY

Condition I - Water Surface Elevation at Spillway Crest (1231)

a. Reservoir Drains: 2 - 30" ϕ C.I. pipes, $\frac{1}{2}$ pipe El. 1178.5

$$Q_f = C A \sqrt{2gh} = 0.95(2\pi 2.5^2/4)(64.4(1231-1178.5))^{1/2} = 542 \text{ cfs}$$

b. Water Supply Blowoff: 20" ϕ C.I., $\frac{1}{2}$ pipe El. 1177 (Est.)

$$Q_f = C A \sqrt{2gh} = 0.95(\pi (20/12)^2/4)(64.4(1231-1177))^{1/2} = 122 \text{ cfs}$$

Total Outlet Works Capacity for Condition I = $542 + 122 \approx 664 \text{ cfs}$

SURCHARGE-STORAGE ROUTINGInflow Test Flood, $Q_p = 5,575$ cfs (see page for Test Flood Determination)Surcharge Height to Pass Q_p is El. 1238.6

$$STOR_1 = \frac{\text{Surcharge Storage}}{\text{Drainage Area}} = \frac{122 \text{ ac-ft} \times 12 \frac{\text{ft}}{\text{ft}}}{1919 \text{ acres}} = 1.03 \text{ inches}$$

$$\text{Probable Max. Flood Runoff, } Q_p = Q_p \left(1 - \frac{STOR_1}{19}\right) = 5,575 \left(1 - \frac{1.03}{19}\right) = 5,272 \text{ cfs}$$

Surcharge Height to pass Q_p is El. 1238.5

$$STOR_2 = \frac{120 \text{ ac-ft} \times 12 \frac{\text{ft}}{\text{ft}}}{1919} = 1.01 \text{ inches}$$

$$STOR_{AVG} = \frac{1.03 + 1.01}{2} = 1.02 \text{ inches}$$

$$Q_{p3} = 5,575 \left(1 - \frac{1.02}{19}\right) = 5,275 \text{ cfs}$$

Surcharge Height to Pass Q_p is El. 1238.5'

$$\therefore \text{Peak inflow} = 5,575 \text{ cfs}$$

$$\text{Peak outflow} = 5,275 \text{ cfs}$$

$$\text{Surcharge Elevation to pass Peak Outflow} = 1238.5'$$

Spillway Capacity at Test Flood elevation

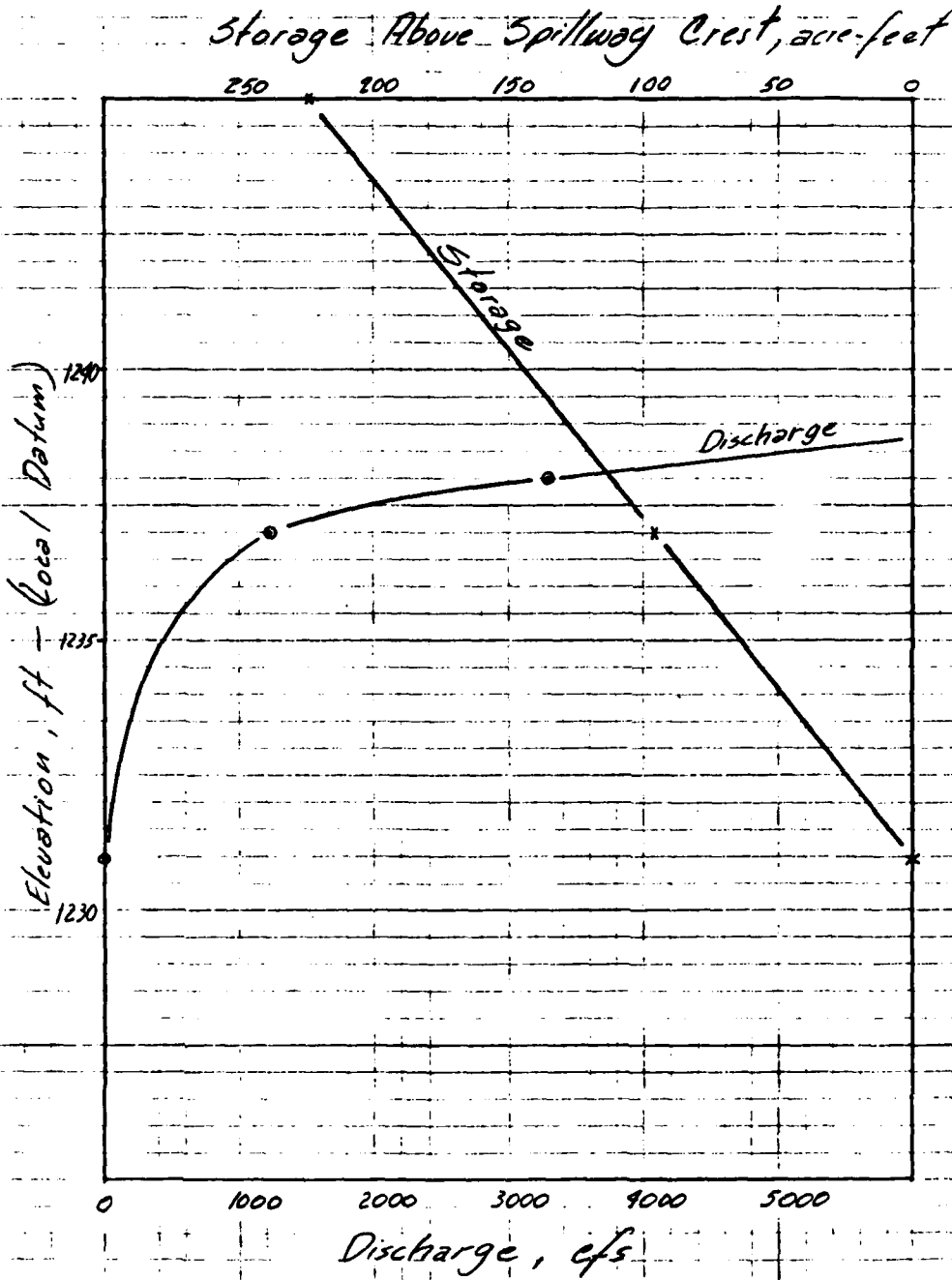
$$Q_s = 500 + 1130 + 150 = 1,780 \text{ cfs}$$

CAMP DRESSER & MOORE INC.

CLIENT COE
 PROJECT Dam Inspection
 DETAIL Natch Reservoir Dam

JOB NO 310-6-RT-5
 DATE CHECKED 7/23/79
 CHECKED BY MD

PAGE 5
 DATE 7-18-79
 COMPUTED BY be H.



Stage-Discharge Relationship

W.S. El. (ft)	Spillway Discharge (cfs)	Left Bank (Dam + some Overbank) discharge (cfs)	Total Discharge (cfs)
1230.9	-	-	ZERO
1237	1216	-	1216
1238	1587	1719	3306
1239	1989	4863	6852
1240	2421	8933	11354

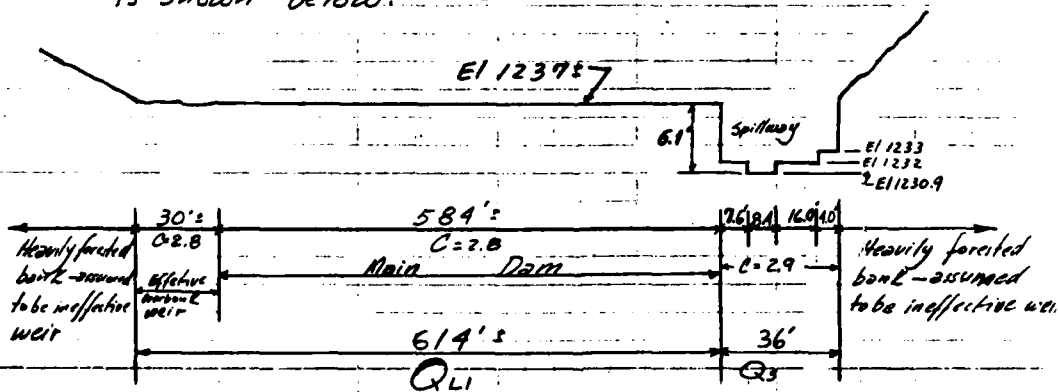
Notch Reservoir is classified as being of intermediate size based on hydraulic height, and of high hazard, therefore, the test flood is a full PMF.

The watershed of Notch Reservoir is heavily forested with steep side slopes. The area is totally undeveloped. The drainage area is about 2.2 square miles of which 0.7 percent is reservoir surface area.

Based on the characteristics of the watershed, the PMF will be based on the "mountainous" curve developed by NED Corps of Engineers in "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations".

STAGE-DISCHARGE RELATIONSHIP

Determine the S-O relationship based on no flashboard in place at the spillway. The effective weir profile is shown below:

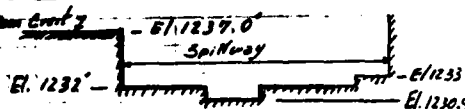


Weir Profile

N.T.S.

CLIENT COEJOB NO 380-6-RT-5PAGE 2PROJECT Dam InspectionDATE CHECKED 7/23/79DATE 7-18-79DETAIL Notch Reservoir DamCHECKED BY MDCOMPUTED BY Joe H.ELEVATIONS

Spillway Crest without flashboards 1230.9'
 Crest of Dam 1237.0
 Toe of Dam 1177.0



Elevations based on local datum. Local datum is about 15 feet lower than National Geodetic Vertical Datum.

SURFACE AREAS

Notch Reservoir Drainage Area 1419 acres or 2.22 sq. mi.
 @ Spillway Crest Elevation (1230.9) 11.0 acres
 @ Elevation 1245 ----- 21.1 acres
 @ Elevation 1265 ----- 32.1 acres

STORAGE VOLUMES

@ Spillway Crest (Elev. 1230.9), Storage based on operation charts is 274 ac-ft. However, some siltation has occurred. If we assume that one fourth of the total volume has been filled with silt, storage volume at spillway crest ≈ 205 ac-ft.

@ Crest of Dam (Elev. 1237), Storage $\approx 205 + (21.1 + 11.0)6 = 301$

@ Elevation 1245, Storage $\approx 301 + (21.1 + 11.0)8 = 429.5$

@ Elevation 1265, Storage $\approx 429.5 + (32.1 + 21.1)20 = 961.5$

SIZE CLASSIFICATION

Hydraulic Height = 60 ft \therefore intermediate

Storage at Top of Dam ≈ 301 ac-ft \therefore small

HAZARD CLASSIFICATION

The dam failure analysis (pages 8-10) indicates a high potential for loss of life and property

hazard is HIGH

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT _____
PROJECT DAM STUDY
DETAIL NOTCH

JOB NO 380-6-RT-5
DATE CHECKED 5-7-79
CHECKED BY JES B.

PAGE 1
DATE 4/11/79
COMPUTED BY CPM

SCALE OF MAPPING $1" = 2000'$ sq. in. $\times 91.83 =$ ACRES (A)
 $\text{A} = 640 = \text{mi}^2$

DRAINAGE AREA

1. 15.44
2. 15.46 } $15.45 \text{ ave} = 15.45 \text{ in}^2 = \frac{1418.8}{500.5 \text{ A}} = \frac{2.217}{0.782 \text{ mi}^2}$

WATER SURFACES

EL. 1246

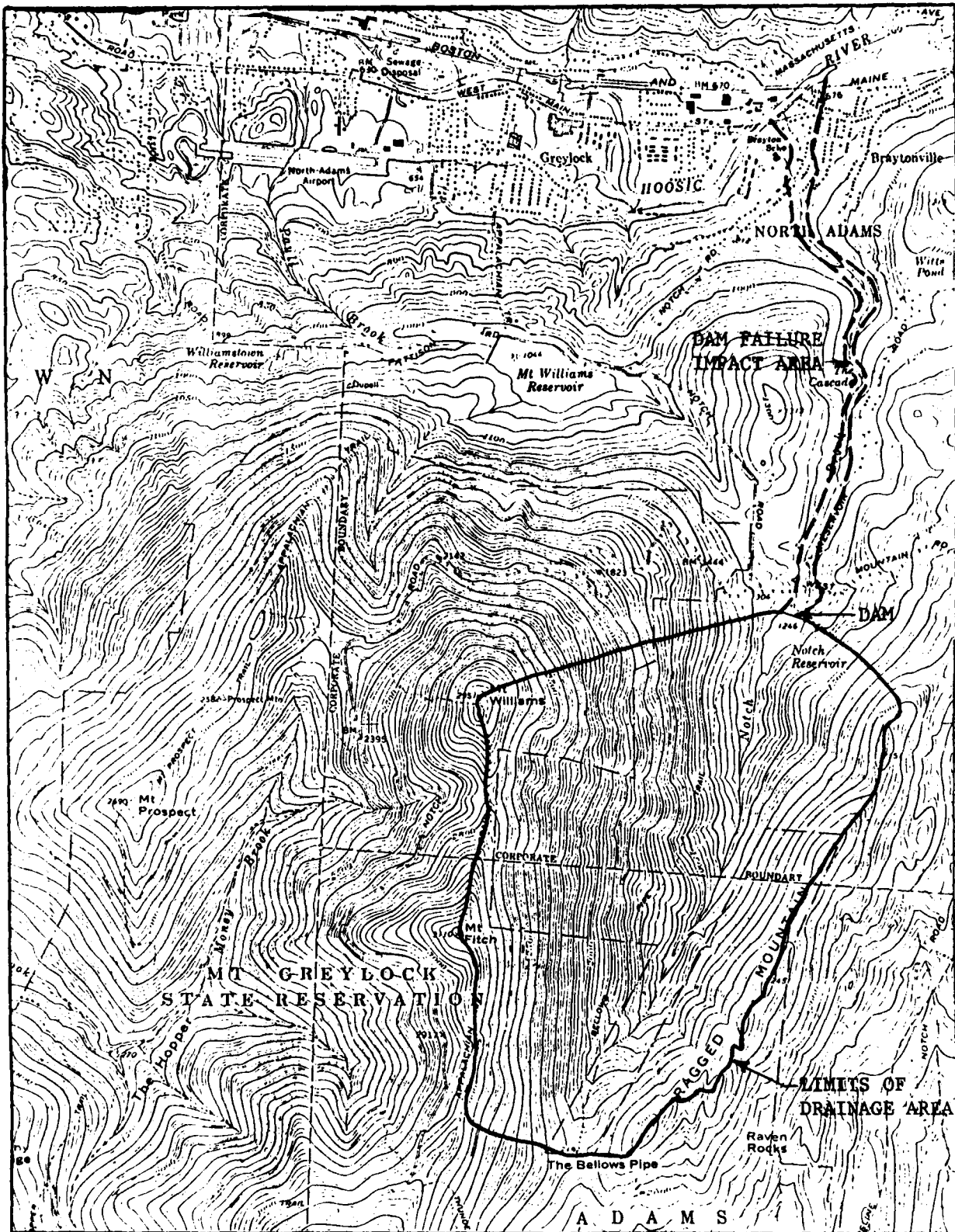
1. 0.13
2. 0.11 } $0.12 \text{ ave} = 0.12 \text{ in}^2 = 11.0 \text{ A} = 0.017 \text{ mi}^2$

EL. 1260

1. 0.24
2. 0.22 } $0.23 \text{ ave} = 0.23 \text{ in}^2 = 21.1 \text{ A} = 0.033 \text{ mi}^2$

EL. 1280

0.34
0.36 } $0.35 \text{ inches sq.} = 32.1 \text{ acres} = 0.050 \text{ sq. mi.}$



DAM NOTCH RESERVOIR

IDENTIFICATION NO. MA 00283



DRAINAGE AREA AND DAM
FAILURE IMPACT AREA MAP

APPROX. SCALE: 1" = 2700'

APPENDIX D
OUTLINE OF DRAINAGE AREA AND
HYDRAULIC COMPUTATIONS

OUTLINE OF DRAINAGE AREA

Drainage Area and Dam Failure Impact Area Map

Page No.

D-1

COMPUTATIONS

Drainage Area; Water Surface Areas

D-2

Elevations; Surface Areas; Storage Volumes;

Size Classification; Hazard Classification

D-3

Test Flood Determination; Stage-Discharge

Relationship

D-4

Surcharge-Storage Routing

D-7

Tailwater Analysis; Outlet Works Capacity

D-8

Diversion Conduit Capacity; Total Discharge -

Outlet Works plus Diversion Conduit Capacity

D-9

Dam Failure Analysis

D-10



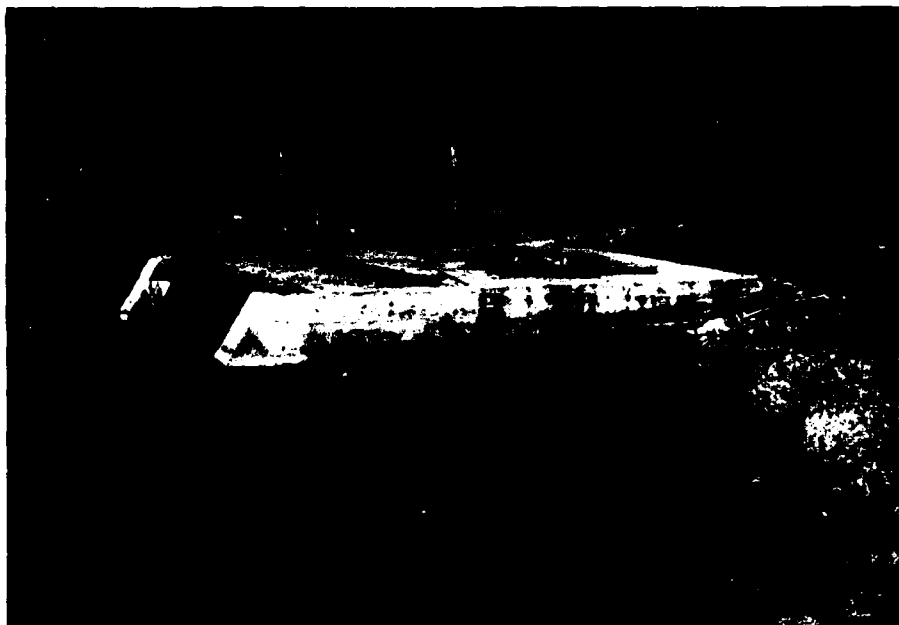
12. GATE VALVE STEMS FOR WATER SUPPLY MAINS LOCATED
TO THE LEFT OF GATEHOUSE.



10. DOWNSTREAM FACE OF GATEHOUSE. NOTE
RUST STAINED WATER FROM PIPE BENEATH
DISCHARGE CHANNEL LEFT WALL.



11. INTERIOR OF GATEHOUSE



8. INTAKE STRUCTURE AT DAM LEFT ABUTMENT FOR GRAVITY PIPELINE TO MOUNT WILLIAMS RESERVOIR.



9. LEAKAGE BETWEEN LEFT STOPLOG GUIDE AND CENTER PIER IN INTAKE FOR PIPELINE TO MOUNT WILLIAMS RESERVOIR.

at Notch Road (160 ft sq), and the two box culverts under Route 2 can only convey a small fraction of the total flow.

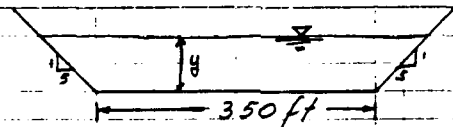
Reach 1: Dam to Notch Road, length of Reach ≈ 9200 ft.

Consider reach upstream of Notch Road to be an open channel with varying geometry and slope.

Compute depth of flow at a section about 500 ft ups of Notch Road.

assume — 1. No tailwater effects
2. Trapezoidal cross section

Approx Section Geometry (taken from USGS Map)



$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2} \quad \text{where: } n = 0.095$$

$$A = (350 + 5y)y$$

$$R = \frac{A}{P} = \frac{(350 + 5y)y}{350 + 2y\sqrt{1.5^2 + 1}}$$

$$S = 0.06$$

by trial, @ $Q = 100,000$ cfs $y = 8.2$ ft.

the value of y indicates the depth of flow in the banks of the brook. The water depth at the centerline of the brook varies from 13 to 15 feet. With such a depth of water, Notch Road will be overtopped by 5 to 6 feet causing extensive damage to life and property. Due to the steep channel slope, velocities upwards of 30 feet per sec can be expected. The combination of high water depths and high velocities means severe flooding to the developed areas within the Dam Failure impact area. Five houses and two dog pounds will be affected upstream of the Notch

CLIENT Corps of EngineersJOB NO 380-G-RF-5PAGE 10PROJECT Dam Insp.DATE CHECKED 7/29/79DATE 5-7-79DETAIL Notch Reservoir DamCHECKED BY JEDCOMPUTED BY Joe H

Road Area Downstream and around this area approximately 70 homes will be affected. Four Roads will be overtopped.

Little storage exists between the Notch Reservoir Dam and the Hoosic River. Consequently the peak dam failure flow of 100,000 cfs reaches the Hoosic River practically unchanged. Such a flow would not be contained within the Hoosic River banks. They would be overtopped creating a potential for loss of life and property downstream on the Hoosic River.

APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS



INVENTORY OF DAMS IN THE UNITED STATES

IDENTITY NUMBER	STATE	COUNTY	CORNER	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
MA 283	MA	003	01	NOTCH RESERVOIR DAM	4240.3	7308.3	31 MAY 79

POPULAR NAME	NAME OF IMPOUNDMENT
NOTCH BROOK	NOTCH RESERVOIR
NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI.)
NORTH ADAMS	0
POPULATION	18400

TYPE OF DAM	YEAR COMPLETED	PURPOSES	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES (ACRE-FT.)	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI.)	POPULATION
REGG	1897	S	60	60	301	205	18400

REMARKS

D/S HAS LENGTH	SPILLWAY TYPE	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CU YD)	POWER CAPACITY (KW)	INSTALLED PROPOSED	NAVIGATION LOCKS
1	620 U	36	1200			

OWNER	ENGINEERING BY	CONSTRUCTION BY
CITY OF NORTH ADAMS	DAVID M GREEN, CE	

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
CAMP DRESSER + MCKEE, INC	30 APR 79	PUBLIC LAW 92-367

REMARKS

END

FILMED

7-85

DTIC